TM 32-5825-001-10

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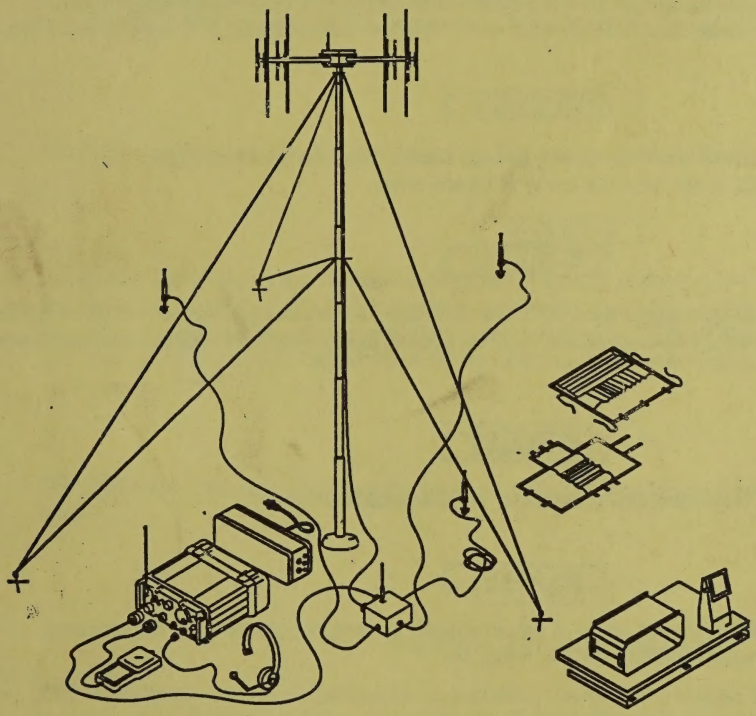
TECHNICAL MANUAL

OPERATOR'S MANUAL

DIRECTION FINDER SET AN/PRD-12



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AUGUST 1990

WARNINGS

WARNING

Lowering and raising the VHF/UHF antenna subsystem requires two people. The mast must be supported when loosening guys. Serious personal injury and/or equipment damage may result if the VHF/UHF antenna subsystem is allowed to fall when the mast is extended to its full height.

WARNING

DO NOT let mast drop. The mast may cause personal injury and/or equipment if dropped.

WARNING

Do not place the OL-470 directly under the antenna array when it is deployed by hanging on a line. Serious personal injury and equipment damage may occur if the antenna should fall during operation.

WARNING

Stay upwind of the antenna array when operating in high winds. Serious personal injury and equipment damage may result if the antenna array is blown down.

WARNING

A lithium-sulfur dioxide (Li-SO_2) battery used with the AN/PRD-12 contains pressurized sulfur dioxide (SO_2) gas. The gas is toxic, and the battery MUST NOT be abused in any way that may cause the battery to rupture.

WARNING

DO NOT heat, short circuit, crush, puncture, mutilate, or disassemble batteries.

WARNING

DO NOT USE any battery which shows signs of damage, such as bulging, swelling, disfigurement, brown liquid in the plastic wrap, a swollen plastic wrap, etc.

WARNING

DO NOT test Li-SO_2 batteries for capacity.

WARNING

DO NOT recharge Li-SO_2 batteries. Lithium based batteries may explode during recharging, causing severe personal injury and/or equipment damage.

WARNING

DO NOT use water to extinguish Li-SO_2 battery fires if a shock hazard exists due to high voltage electrical equipment in the immediate vicinity [i.e., greater than 30 volts, alternating current (ac) or direct current (dc)].

WARNING

If the battery compartment becomes hot to the touch, if you hear a hissing sound or smell irritating sulfur gas, IMMEDIATELY turn off the equipment. Remove the equipment to a well ventilated area .

WARNING

DO NOT use a Halon type fire extinguisher on a lithium battery fire.

WARNING

In the event of a fire near a lithium battery, rapid cooling of the battery is important. Use a carbon dioxide (CO_2) extinguisher. Control of the equipment fire, and cooling, may prevent the battery from venting and potentially exposing lithium metal. In the event that lithium metal becomes involved in fire, the use of a graphite based Class D fire extinguisher is recommended, such as Lith-X or MET-L-X.

WARNING

DO NOT store lithium batteries with other hazardous materials and keep them away from open flame or heat.

WARNING

NICKEL-CADMIUM BATTERIES

The electrolyte used in nickel-cadmium batteries contains potassium hydroxide (KOH), which is a caustic agent. Serious and deep burns of body tissue will result if the electrolyte comes in contact with the eyes or any part of the body. Use rubber gloves, rubber apron, and protective goggles when handling the electrolyte. If accidental contact with the electrolyte is made, use ONLY clean water and immediately (seconds count) flush contaminated areas. Continue flushing with large quantities of clean water. Seek medical attention without delay. Inform medical personnel that you have been contaminated with potassium hydroxide (KOH).

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 29 AUGUST 1990

Operator's Manual
DIRECTION FINDER SET
AN/PRD-12

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find a mistake, or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Equipment Publications and Blank Forms) direct to: Director, USACIMMC, Attn: SELIM-TE, Vint Hill Farms Station, Warrenton, Virginia 22186-5279. A reply will be furnished to you.

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Chapter 4 - Contains maintenance procedures for equipment used with the basic equipment of the AN/PRD-12.

Appendix A - References - Lists the manuals, pamphlets, etc., referenced in this manual.

Appendix B - Components of End Item (COEI) and Basic Issue Items (BII) List - Lists and illustrates, in alphabetical sequence, equipment comprising an operating AN/PRD-12.

Appendix C - Additional Authorization List (AAL) - Lists and illustrates, in alphabetical sequence, equipment comprising an operating AN/PRD-12.

Appendix D - Expendable Supplies and Materials List - Lists disposable materials required to operate and maintain the equipment.

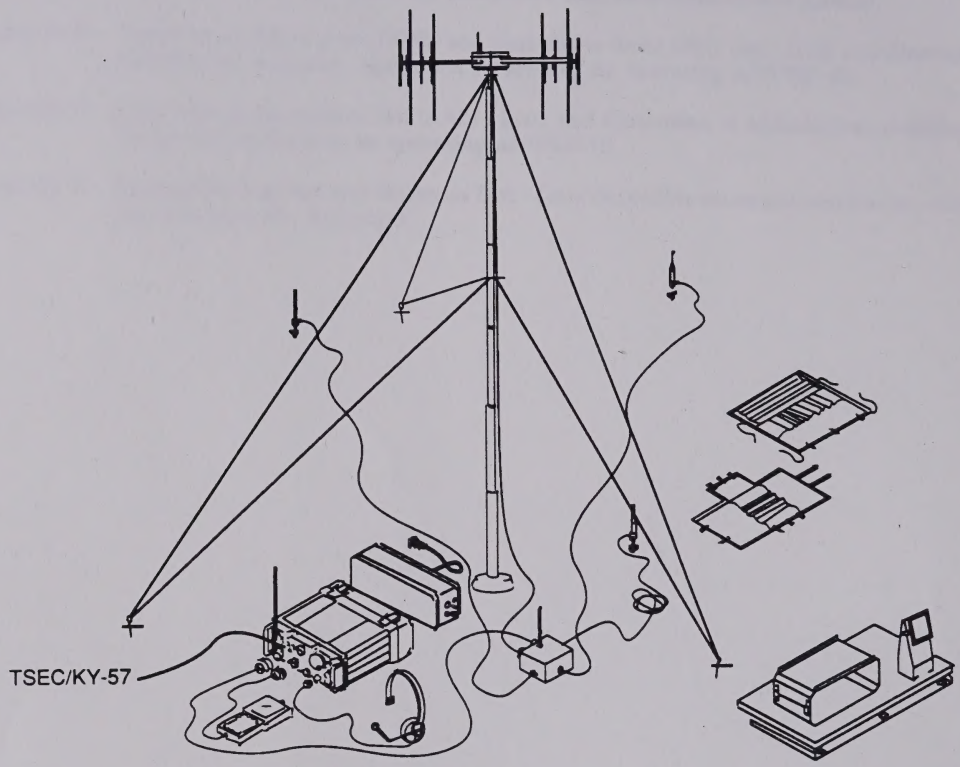

FIGURE 1-1. Direction Finder Set, AN/PRD-12.

CHAPTER 1

INTRODUCTION

SECTION I. GENERAL INFORMATION

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Maintenance Forms and Records	1-2	1-1
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1-1. SCOPE.

This manual provides instructions for operating Direction Finder Set AN/PRD-12 (Figure 1-1). The AN/PRD-12 may be used in a group of up to four AN/PRD-12 or AN/TRQ-32(V) intercept and direction finding (DF) stations, operating in a radio-linked network. The AN/PRD-12 performs search, intercept, and DF functions on radio transmissions from tactical targets in the forward area. The AN/PRD-12 station consists of light, rugged, man-transportable radio DF and communications equipment that is deployable in many types of terrain and under most weather conditions. When operating as a stand-alone station, it provides a line of bearing (LOB) to target emitters. As a member of a DF network, it supports rapid location of target emitters.

1-2. MAINTENANCE FORMS AND RECORDS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS).

1-3. HAND RECEIPT (-HR) MANUALS.

This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). TM 32-5825-001-10-HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (i.e., COEI, BII, AAL) you must account for. As an aid to property accountability, additional -HR manuals may be requisitioned from the following source in accordance with the procedures in Chapter 3, AR 310-2:

USACIMMC
ATTN: SELIM-TE
Vint Hill Farms Station
Warrenton, VA 22186-5279

1-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your AN/PRD-12 needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at Commander, Communication Electronic Command, Attn: AMSEL-PA-MA-D, Ft. Monmouth, N.J. 07703. We'll send you a reply.

1-5. WARRANTY INFORMATION.

The AN/PRD-12 is warranted by the manufacturer for: a) one year, from date of acceptance, for design/manufacturing conformance; b) one year or 360 operational hours, whichever comes last, from date of acceptance, for material and workmanship; c) one year, from date of acceptance, for essential performance. Warranty starts on the date found in block 23, DA Form 2408-9, in the logbook. Refer to Warranty Technical Bulletin TB 32-5825-001-20-1 for further details. Report all defects in material or workmanship to your supervisor, who will take appropriate action.

1-6. GLOSSARY.

This listing contains an explanation of terms (glossary) used in this manual.

ADC	Angle-to-Digital Converter
AGC	Automatic Gain Control
AM	Amplitude Modulation
AOA	Angle of Arrival
BFO	Beat Frequency Oscillator
BIT	Built-In-Test
BITE	Built-In-Test Equipment
CPU	Central Processing Unit
CW	Continuous Wave
DF	Direction Finder
DU	Display Unit
EEP	Elliptical Error Probability
EEPROM	Electronically Erasable and Programmable Read-Only Memories
FDF	Fast Direction Finder
FM	Frequency Modulation
HF	High Frequency
ICW	Intermittent Continuous Wave
IF	Intermediate Frequency
LCD	Liquid Crystal Display
LOB	Line of Bearing
LOS	Line of Sight
LSB	Lower Side Band
MHI	Magnetic Heading Indicator
NCS	Net Control Station
NFE	Noise Floor Estimate
OOK	On/Off Keyed
PTT	Push-to-Talk
QF	Quality Factor
RAM	Random Access Memory
RCU	Receiver Control Unit
RF	Radio Frequency

UHF	Ultra High Frequency
USB	Upper Side Band
UTM	Universal Transverse Mercator
VHF	Very High Frequency
VRTX	Virtual Real-Time Executive
WIEC	Weapons Individual Equipment Container

SECTION II. Equipment Description and Data

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Location and Description of Major Components	1-8	1-3
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1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

The AN/PRD-12 consists of Receiver Group OL-470/PRD-12, Antenna AS-4143/PRD-12, Antenna AS-4144/PRD-12, Battary Charger G-83/PRD-12 and Electrical Equipment Mounting Base MT-6700/PRD-12, RF/Control cable assembly W1, and HF/Control cable assembly W2.

The AN/PRD-12 operates as part of a direction finding network, which typically consists of up to four AN/PRD-12 or AN/TRQ-32(V) stations. One of the stations is initialized as the Net Control Station (NCS) while the other three are initialized as slaves. Upon direction from the NCS, the slave stations will intercept signals in the high frequency (HF) and/or very-high frequency/ultra-high frequency (VHF/UHF) range and will compute LOB data. This data is relayed over the data link in a secure mode to the NCS.

Since VHF/UHF signals are blocked by obstructions (trees, mountains and buildings), the VHF/UHF antennas must have a clear line of sight (LOS) to the target area. Each station must also have a clear LOS to the NCS to communicate over the secure voice/data link.

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

The following figures show the locations of major AN/PRD-12 components, with a brief description of each.

1-8.1. Receiver Group 0L-470/PRD-12

Figure 1-2 presents an illustration of Receiver Group OL-470/PRD-12. Major components of the equipment group are keyed to descriptive information presented in table 1-1.

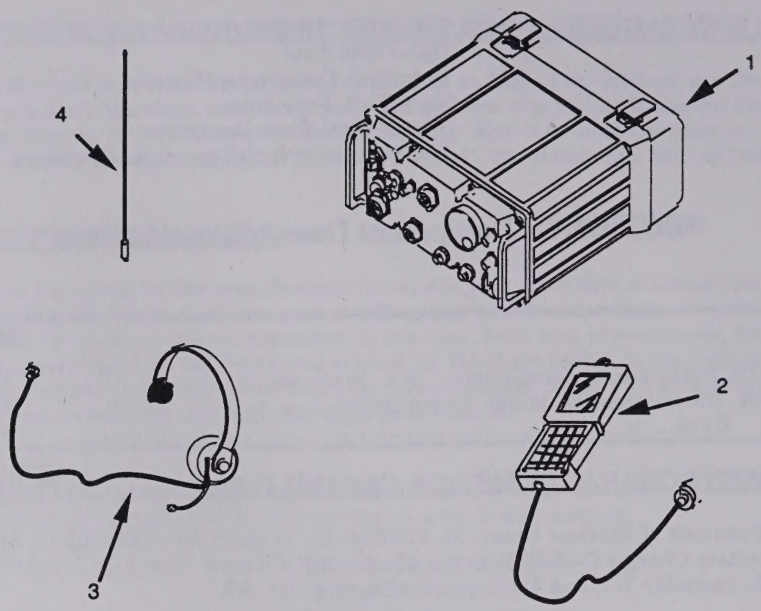

FIGURE 1-2. Receiver Group OL-470/PRD-12 Major Components.

Table 1-1. Receiver Group OL-470/PRD-12 Major Components

Key	Common name	Description
1	Receiver/Processor	Sends baseline selection commands to VHF/UHF Antenna (AS-4143/PRD-12) and/or HF Antenna (AS-4144/PRD-12). Receives baseline RF signals and heading status from the VHF/UHF Antenna and RF signals and status from the HF Antenna.
2	Display Unit (Display Unit ID-2465/PRD-12)	Provides operator interface with the AN/PRD-12, via a 20-key keypad, and liquid crystal (LCD) graphic and alphanumeric display.
3	Headset (Electrical Headset H-362/PRD-12)	Provides operator with received audio and microphone for transmitting.
4	Intercept Antenna	Used for on-the-move intercept and out-of-band intercept when AN/PRD-12 is deployed with only one antenna. Provides search and intercept capability for the HF, VHF and UHF bands.

1-8.2. Antenna AS-4143/PRD-12

Figure 1-3 presents an illustration of Antenna AS-4143/PRD-12. Major components of the equipment group are keyed to descriptive information presented in table 1-2.

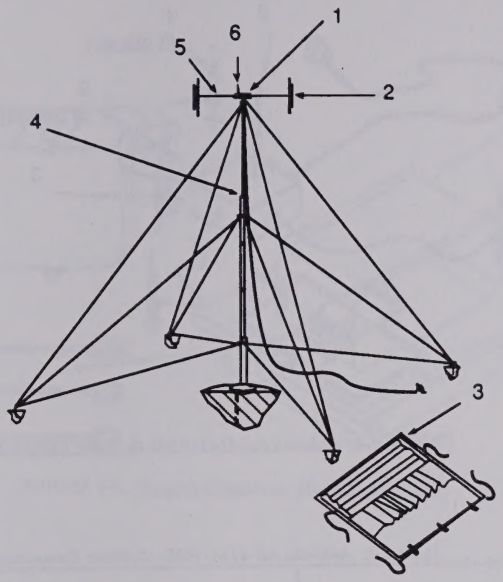

FIGURE 1-3. Antenna AS-4143/PRD-12 Major Components.

Table 1-2. Antenna AS-4143/PRD-12 Major Components

Key	Common name	Description
1	VHF/UHF Processor	Provides baseline RF signals and heading/status to the OL-470/PRD-12 Receiver group.
2	UHF Antenna Support Arms	Supports UHF antennas and connects them to the VHF/UHF Processor.
3	VHF/UHF Antenna Storage Bag	Provides protective storage for AS-4143/PRD-12 equipment.
4	Light Weight Mast	Provides a vertical mounting surface for antenna subsystem.
5	VHF Antenna Support Arms	Supports VHF antennas and connects them to the VHF/UHF Processor.
6	BIT Antenna	Provides for the transmission of test signals for self-test purposes.

1-8.3. Antenna AS-4144/PRD-12

Figure 1-4 presents an illustration of Antenna AS-4144/PRD-12. Major components of the equipment group are keyed to descriptive information presented in table 1-3.

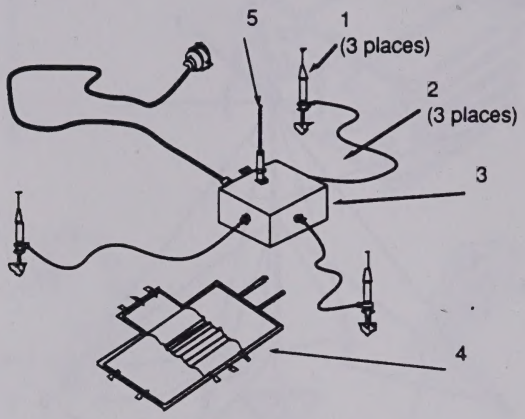

FIGURE 1-4. Antenna AS-4144/PRD-12 Major Components.

Table 1-3. Antenna AS-4144/PRD-12 Major Components

Key	Common name	Description
1	HF Antenna Assemblies	Provides reception in the HF range.
2	HF Antenna Cable Assemblies	Provides for the interconnection of antenna assemblies and the HF Processor.
3	HF Processor	Provides baseline RF signals to the receiver/processor.
4	HF Antenna Storage Bag	Provides protective storage for AS-4144/PRD-12 equipment.
5	HF BIT Antenna	Provides for the transmission of test signals for self-test purposes.

1-8.4. Support Equipment

Figure 1-5 presents an illustration of the AN/PRD-12 support equipment. Major components of the equipment group are keyed to descriptive information presented in table 1-4.

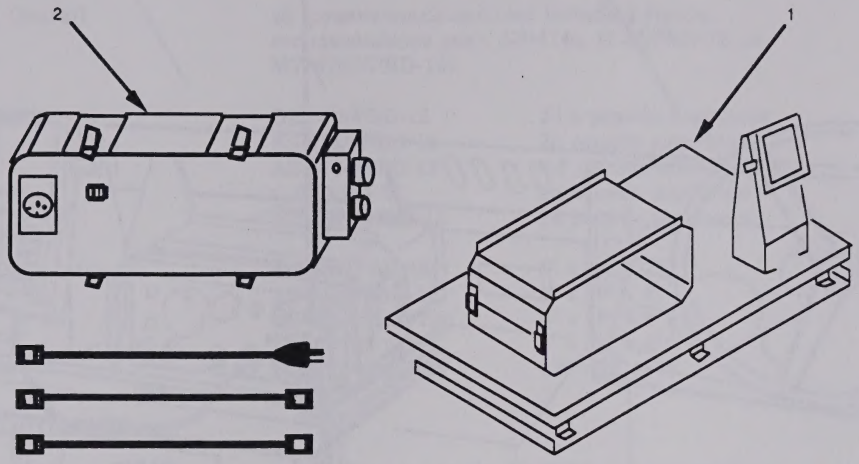

FIGURE 1-5. Support Equipment Major Components.

Table 1-4. Antenna AS-4144/PRD-12 Major Components

Key	Common name	Description
1	Electrical Equipment Mounting Base MT-6700/PRD-12	Provides the capability for mounting the OL-470/PRD-12 either in or on a M998 vehicle.
2	G-83/PRD-12 Battery Charger	Provides the capability for operating the AN/PRD-12 from either a +12V dc, +24 V dc or +28 V dc power source or from a 90-to-260 V ac, 47-to-440 Hz, power source. Operation from the ac power source allows for simultaneous battery recharging and AN/PRD-12 system operation.

1-8.5 Vehicle Mounted Configuration

Figure 1-6 presents an illustration of the AN/PRD-12 in a typical vehicle mounted configuration.

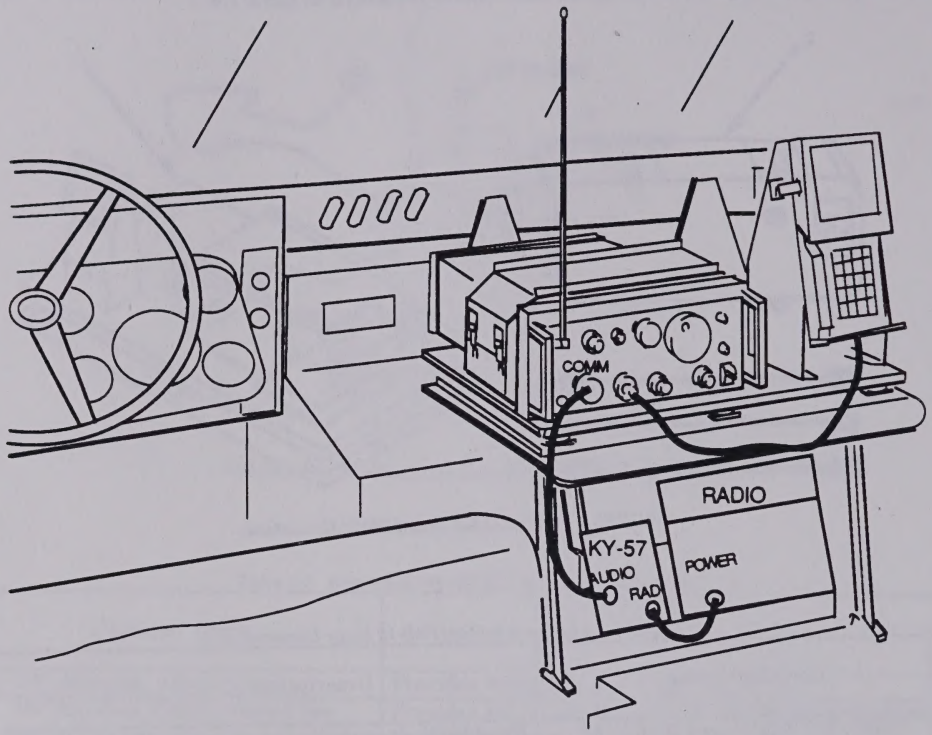

FIGURE 1-6. Vehicle Mounted Configuration.

1-9. EQUIPMENT DATA.

The following paragraphs describe the AN/PRD-12. They are broken into three categories; General, Weights and Dimensions, and Performance.

1-9.1. General.

Make/Model	AN/PRD-12
Equipment Type	Mobile tactical communications intelligence sensor
Major Components	Receiver Group OL-470/PRD-12, Antenna AS-4143/PRD-12, Antenna AS-4144/PRD-12, Electrical Equipment Mounting Base MT-6700/PRD-12, and Battery Charger G-83/PRD-12

Radioactive Material Type	Tritium gas (trace amounts) are used in antenna surge arrestors. Required for lightning protection.

1-9.2. Weights and Dimensions.

Weight Overall	45 pounds maximum (not including crypto, communications gear, AS-4144, G-83/PRD-12, or MT-6700/PRD-12)	
Components	OL-470/PRD-12	23.5 pounds maximum
	AS-4143/PRD-12	20 pounds maximum
	AS-4144/PRD-12	9.5 pounds maximum
	G-83/PRD-12	14 pounds maximum
	MT-6700/PRD-12	14 pounds maximum
Dimensions (stowed) (H x W x D)	OL-470/PRD-12	5" x 12" x 13"
	AS-4143/PRD-12	7" x 38" x 12"
	AS-4144/PRD-12	5" x 15" x 9"
	G-83/PRD-12	5" x 14" x 4"
	MT-6700/PRD-12	12" x 22" x 12"

1-9.3. Performance.

Operating Modes	Local, Remote (Automatic NCS), Interoperability
Operating Temperature	High +125° F (+51.67° C) Low -25° F (-31.67° C)
Modulation Characteristics	Single Side-band (SSB), Amplitude Modulated (AM), Frequency Modulated (FM), Interrupted Continuous Wave (ICW), and Frequency Shift Keyed (FSK)
Accuracy	
BIT Oscillator	±1 kHz
HF Frequency	±40 Hz @ 20 MHz
VHF/UHF Frequency	<±1 kHz
Bandwidths	3 kHz, 10 kHz, 25 kHz, 50 kHz, 100 kHz, 300 kHz
Voltages	
Battery	10 - 16 V dc (BA-4386, BB-586, BA-5598)
Battery Charger	12 - 28 V dc; 90 to 260 V ac, 47-440 Hz
Power Consumption	
AS-4144/PRD-12	1350 mW maximum
AS-4143/PRD-12	1295 mW maximum
OL-470/PRD-12	16,700 mW maximum

Noise Figure

HF	<20 dB
VHF/UHF	<13 dB

VSWR

HF	<1.5:1
VHF/UHF	<1.5:1

SECTION III. Technical Principles of Operation

	Para	Page
Functional Description of Equipment Operation	1-10	1-10

1-10. FUNCTIONAL DESCRIPTION OF EQUIPMENT OPERATION.

1-10.1. System Description.

The AN/PRD-12 provides search, intercept and DF functions on signals in the HF/VHF/UHF bands. Up to four AN/PRD-12 or AN/TRQ-32(V) stations can be networked, providing DF data to an mission control station via a radio link. Each station has the ability to function as a NCS, allowing it to fix targets based on data transmitted from stations within the network. When stations are networked, they provide target emitter position data to mission control via a voice link. A complete station can be relocated rapidly, optimizing its use in forward areas. Figure 1-5 presents a typical AN/PRD-12 operating scenario.

Operation in a DF network consisting of a mixture of AN/PRD-12 and AN/TRQ-32(V) stations requires no special action by the AN/PRD-12 operator when an AN/PRD-12 station is the NCS. Any AN/PRD-12 station (NCS or slave) can command fixes when the network is not busy. When the AN/TRQ-32(V) is operating as the NCS, only the NCS should command fixes. This is because the AN/TRQ-32(V), when configured as the NCS, will not accept DF tasking from a slave station. Additionally, AN/TRQ-32(V) slaves stations will not command fixes. When the AN/TRQ-32(V) NCS receives a DF tasking message from an AN/PRD-12 slave station, it responds with "UNKNOWN MESSAGE-CHECK NET", which is a normal response.

1-10.2. Station Description.

When operating as a stand-alone station, the AN/PRD-12 provides LOBs to target emitters. When used as a member of a DF network, the AN/PRD-12 supports rapid location of target emitters. A DF network is comprised of up to four AN/PRD-12 or AN/TRQ-32(V) stations.

The AN/PRD-12 may be configured for deployment under a number of mission conditions. It consists of AS-4143/PRD-12 (VHF/UHF antenna subsystem), AS-4144/PRD-12 (HF antenna subsystem) and OL-470/PRD-12 (receiver/processor subsystem) with integral intercept whip antenna.

This design allows for the selection of antenna configurations tailored to a particular mission. When used with both the AS-4143/PRD-12 and AS-4144/PRD-12, it provides limited immunity to total system failure due to loosing a single antenna subsystem. The AS-4143/PRD-12 is the primary antenna and facilitates search, intercept, and DF coverage in the VHF/UHF bands. The AS-4144/PRD-12 provides accurate DF and intercept in the HF band. The OL-470/PRD-12 can be used with the integral whip antenna to provide search and intercept functions in the HF, VHF and UHF bands. The AN/PRD-12 station can be broken down into two man-transportable loads for deployment on foot, by land vehicle or boat, and may be carried as part of a parachutists load.

1-10.3. Antenna AS-4143/PRD-12 (VHF/UHF).

Antenna AS-4143/PRD-12 consists of: a four-element VHF antenna array and an eight-element UHF antenna array, mounted on four feed-arm assemblies; a VHF/UHF processor; a magnetic heading indicator (MHI); RF and control cabling; and a quick-erecting, collapsible mast. It is normally deployed on the mast, which allows the antennas to be erected to heights of from six to 20 feet. Optimum intercept and DF performance are achieved when the antenna is deployed at 20 feet. Reduced performance will result when the antenna is deployed at less than maximum height. If deployed in an area where the mast is not usable, Antenna AS-4143/PRD-12 may be suspended from a tree; however, performance is reduced when this deployment method is used.

The VHF/UHF processor, under control of Receiver Group OL-470/PRD-12, switches among antenna element pairs and routes the RF signals to the OL-470/PRD-12. Each pair of antenna elements form a DF baseline. The phase difference between the two elements is used by the receiver/processor to calculate the angle of arrival of the RF energy. The MHI provides an indication of the antenna array orientation with respect to magnetic north. MHI and angle of arrival (AOA) data are used to calculate the LOB to the signal emitter. The LOB is then aligned to grid north by the OL-470/PRD-12. The RF processor provides a VHF/UHF distribution network to support search and intercept operations in both the VHF and UHF bands.

1-10.4. Antenna AS-4144/PRD-12 (HF).

Antenna AS-4144/PRD-12 consists of a triangular array (approximately 26 feet per side) of three active vertical monopole antennas and a HF processor. The antenna elements are mounted on stakes in the ground and cabled to the centrally-located HF processor. The HF processor, under Receiver Group OL-470/PRD-12 control, switches among antenna element pairs to form DF baselines. The RF signals from the antenna elements are sent to the OL-470/PRD-12. Since the HF antenna subsystem does not contain an MHI, LOBs on HF signals are calculated using operator-entered antenna array orientation, with respect to grid north. The HF processor also provides a HF distribution network to support search and intercept operations in the HF band.

1-10.5. Receiver Group OL-470/PRD-12.

Receiver Group OL-470/PRD-12 is the AN/PRD-12 controller. It contains a dual-channel receiver, digital processor, Display Unit (DU) ID-2465/PRD-12, Headset H-362/PRD-12, battery case, and an intercept antenna.

1-10.5.1. Receiver.

The receiver is a dual channel, compact, modular, low-power unit. It receives RF signals from the antennas, provides signal tuning, amplification, down-conversion (wide and narrow band intermediate frequencies (IF)), and demodulation. It provides a wide band (2 MHz) 21.4 MHz IF and a 446 kHz narrow band IF at selectable bandwidths of 3, 10, 25, 50, 100, and 300 kHz. The narrowband IF is used for DF operations and is demodulated to provide audio for audio correlation and operator audio monitoring functions.

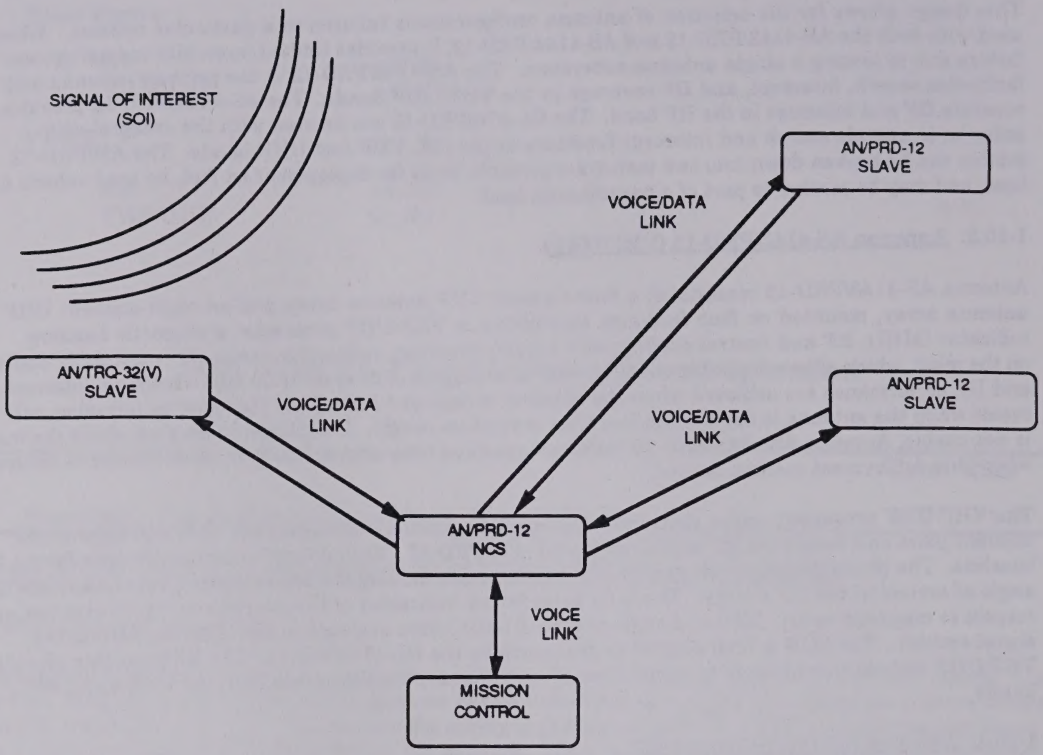

FIGURE 1-5. AN/PRD-12 Typical Operating Scenario.

During DF operations, the receiver operates in the dual-channel mode, providing a narrowband IF from each channel to the digital processor for LOB calculation. During search operations, receiver automatic gain control (AGC) data are sent to the digital processor for signal detection determination. For intercept operations, audio outputs from selectable demodulators are sent to the operator headset for monitoring. The receiver contains a power supply that provides dc operating voltages to the receiver modules.

1-10.5.2. Digital Processor.

The digital processor is a Motorola 68000-based central processing unit (CPU) with non-volatile and volatile memory storage. A mathematics co-processor provides high-speed floating-point arithmetic functions to optimize system throughput. Electrically erasable and programmable read-only memories (EEPROM) provide non-volatile storage. The digital processor contains random access memory (RAM) for quick-execution of programs and storage of perishable data.

The digital processor executes AN/PRD-12 station software while operating under the prioritized, multi-tasking Virtual Real-Time Executive (VRTX) operating system. System software is loaded into EEPROMs at the factory. Individual programs are read from EEPROM, as required, and transferred to RAM for execution. Operator-entered system configuration information is stored in EEPROM for easy retrieval when system operation is interrupted.

The digital processor contains analog-to-digital conversion (ADC) circuitry which is used to digitize narrow band IF signals during DF processing. Digital signal data are sent to a correlator which determines the phase difference between the intercept and DF signal paths. This information is compared with system calibration data to determine the signal AOA. This process is repeated on several baselines to collect the AOA data required for LOB calculation. When LOBs are available from other stations in a network, they may be used to calculate target emitter fixes and elliptical error probability (EEP).

The digital processor is implemented on four plug-in circuit card assemblies (CCAs): central processing unit (CPU) CCA; input, output, and memory (IOM) CCA; analog-to-digital converter (ADC) CCA; and fast DF (FDF) CCA. It contains the power supply that provides dc operating voltages to the digital processor CCAs and antenna subsystems.

1-10.5.3. Display Unit ID-2465/PRD-12.

The DU provides the AN/PRD-12 station operator interface. It is a hand-held unit that contains a 256-by-256 pixel, liquid crystal display (LCD) and a 20-key keypad. The operator enters manual receiver tuning commands, DF commands, time, date, system configuration data, etc., using the keypad. The LCD displays system status and DF processing results to the operator. It is capable of displaying both alpha-numeric and graphic data.

1-10.5.4. Headset H-362/PRD-12.

The headset contains an earphone, a microphone, an audio volume control, and a push-to-talk (PTT) switch. Selected receiver audio signals are routed to the earphones for operator monitoring. The operator controls audio volume using the integral volume control. The microphone and PTT switch permit the operator to communicate via co-located radio communication equipment.

1-10.5.5. Battery Case.

The battery case houses the batteries, which are the primary AN/PRD-12 power source. It mounts on the rear of the receiver/processor unit and provides operating dc power via a feed-through connector. It is designed to be removable, so the AN/PRD-12 station can be operated from a Battery Charger G-83/PRD-12 while recharging the batteries.

1-10.5.6 Intercept Antenna.

The intercept antenna is an integral part of the OL-470/PRD-12 that provides for on-the-move reception of HF, VHF and UHF signals. The intercept antenna can not be used for any DF operations (LOB, cut or fix).

1-10.6. Mounting Base MT-6700/PRD-12.

The MT-6700/PRD-12 consists of a receiver/processor mounting tray, a communications cable and battery charger/eliminator mounting equipment. It is designed for use with the M-998 (or equivalent) tactical vehicle. The mounting tray can be mounted any place in the vehicle that is convenient and provides access to available power.

1-10.7. Battery Charger G-83/PRD-12.

The G-83/PRD-12 is designed to replace the battery case and can also be installed in the receiver/processor mounting tray. The G-83/PRD-12 is capable of operating from +12, +24, and +28 V dc, as well as 90 to 260 V ac, single-phase at frequencies from 47 to 400 Hz. The G-83/PRD-12 provides selectable high and low-level charge current for recharging nickel-cadmium (NiCad) batteries. In addition, it provides 14.6 V dc

operating power for the AN/PRD-12. It is also designed to recharge NiCad batteries while operating the AN/PRD-12 from an ac input.

1-10.8. Equipment Required for Networking.

The following Government Furnished Equipment (GFE) is used with the AN/PRD-12 and is required for network operations. Operation of the GFE is covered in seperate technical manuals, listed in Appendix A.

a. Radio. Provides a communications link between the local AN/PRD-12 and remote AN/PRD-12 or similar systems. The AN/PRD-12 is designed to operate with the AN/PRC-70, AN/PRC-77 and the AN/VRC-12 family of radios. Communications may include either DF tasking or reporting data and voice.

b. Speech Security Equipment TSEC/KY-57. Provides communications security for all transmissions and receptions accomplished via a radio.

1-10.9. Physical Construction.

The AN/PRD-12 is designed so it may be easily broken down and packed in two man-transportable packages. One package contains the receiver group OL-470/PRD-12; the other package contains the VHF/UHF antenna AS-4143/PRD-12 and the HF antenna AS-4144/PRD-12.

1-10.10. DU Screen Hierarchy.

Figures 1-6, 1-7 and 1-8 present the DU screen hierarchy. Figure 1-6 presents the Main Screen display top level contents (boxed items) and the substructure for each top level item. Figure 1-7 presents the Configure Screen display top level contents (boxed items) and the substructure for each top level item. Figure 1-8 presents the BIT Screen display top level contents (boxed items) and the substructure for each top level item.

The Main Screen (Figure 1-6) allows the operator to access the Configure screen, the BIT screen, the Step screen, the Scan screen, the History screen, the Clear Data screen, the Net Interrupt screen, and the Display Elapsed Time screen.

The Configure Screen (Figure 1-7) allows the operator to access the Station Configure screen, the Configure Net screen, the Scan List screen, and the Step List screen. Items presented as branches off the individual screens are functions of the related screen.

The BIT Screen (Figure 1-8) allows the operator to access the Autobit A test screen, the Autobit B test screen, the V/UHF Antenna test screen, and the HF Antenna test screen, the Keypad test screen, the Tuning Wheel test screen, the Headset test screen, Data Link test screen, the Pan Display test screen,and the Audio Recorder test screen. Items presented as branches off the individual screens are functions of the related screen. The Pan Display and Audio Recorder test screens are for maintenance purposes and therefore, not required for use by the operator.

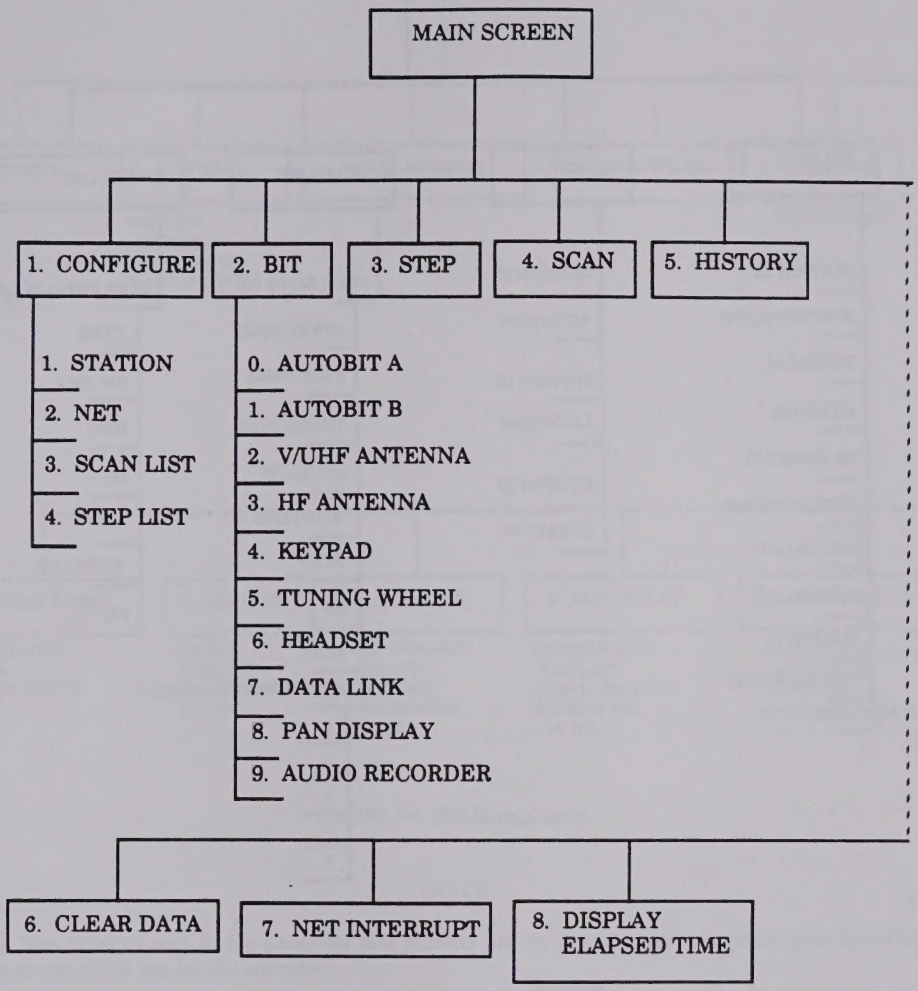

FIGURE 1-6. DU Main Screen Display

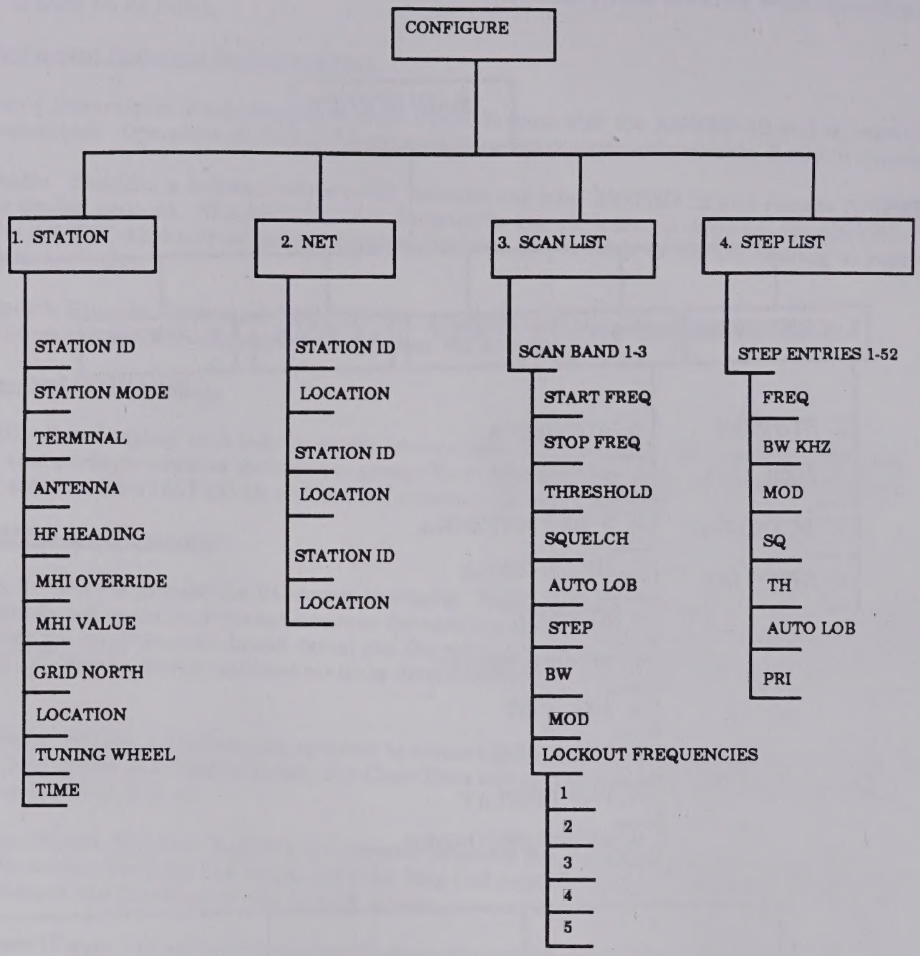

FIGURE 1-7. Configure Screen Display

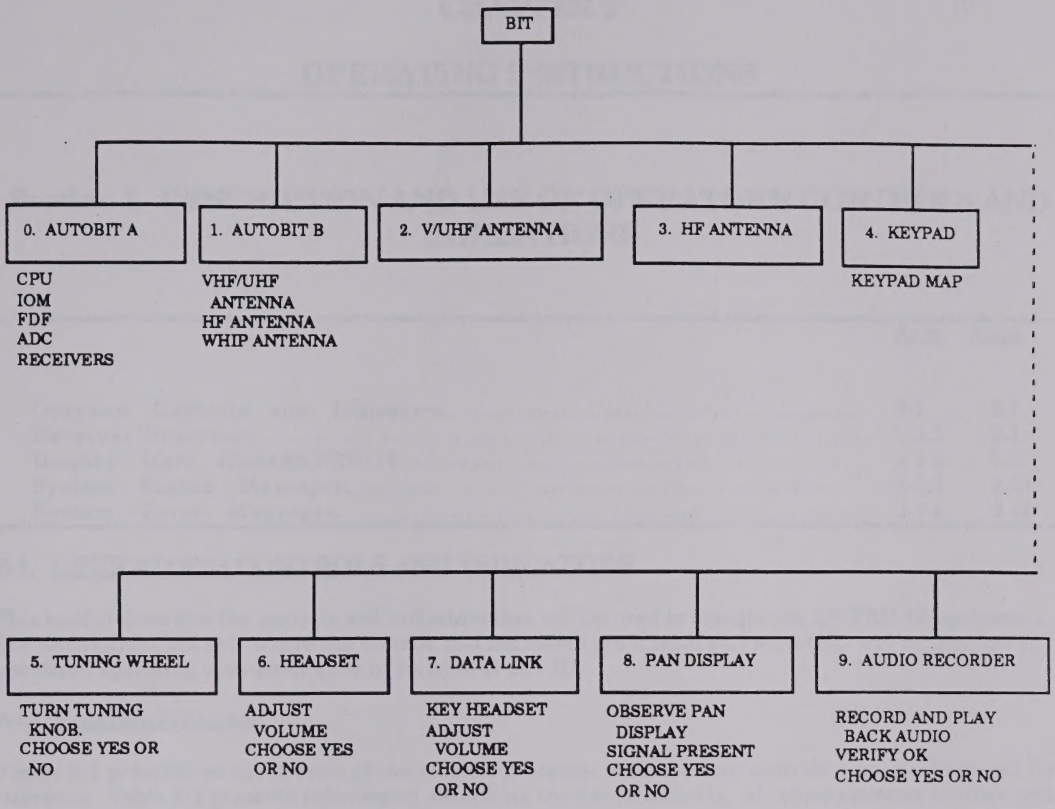

FIGURE 1-8. BIT Screen Display

NOTE

The Pan Display and Audio Recorder test screens are for maintenance purposes and therefore, not required for use by the operator.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATIORS

	Para	Page
Operator Controls and Indicators	2-1	2-1
Receiver/Processor	2-1.1	2-1
Display Unit ID-2465/PRD-12	2-1.2	2-1
System Status Messages	2-1.3	2-12
System Error Messages	2-1.4	2-14

2-1. OPERATOR'S CONTROLS AND INDICATORS.

This section describes the controls and indicators that will be used to operate the AN/PRD-12 equipment. The descriptions tell only where the controls and indicators are located and what they will do, not how to use them; operating instructions are in sections II and III.

2-1.1 Receiver/Processor.

Figure 2-1 presents an illustration of the receiver/processor with operator controls numerically keyed for reference. Table 2-1 presents information describing the keyed controls. All other operator controls and indicators are located on the ID-2465/PRD-12.

2-1.2 Display Unit ID-2465/PRD-12.

Figure 2-2 presents an illustration of Display Unit (DU) ID-2465/PRD-12 with operator controls and indicators numerically keyed for reference. Table 2-2 presents information describing the keyed controls and indicators. Keys **F1, F2, F3** and **F4** are soft keys and perform varying functions, depending upon the current DU screen display. The DU function indication table has an upper section and a lower section. The functions in the upper portion are Fx(a) and are considered SHIFTed functions; the functions in the lower portion are Fx(b) and are considered non-SHIFTed functions. When viewing the DU, the active portion of the function indication table is highlighted. In order to prevent the table from becoming cluttered and confusing, the following information is presented as being true in all cases:

a) All information is presented as if the NET is set up for VOICE mode operations; if NET establishment in the DATA mode causes a difference in the available functions, those differences are presented in parenthesis ().

b) The **F2**(a) EDITRCU functions will change to read EDITOPS whenever the EDITRCU key is pressed.

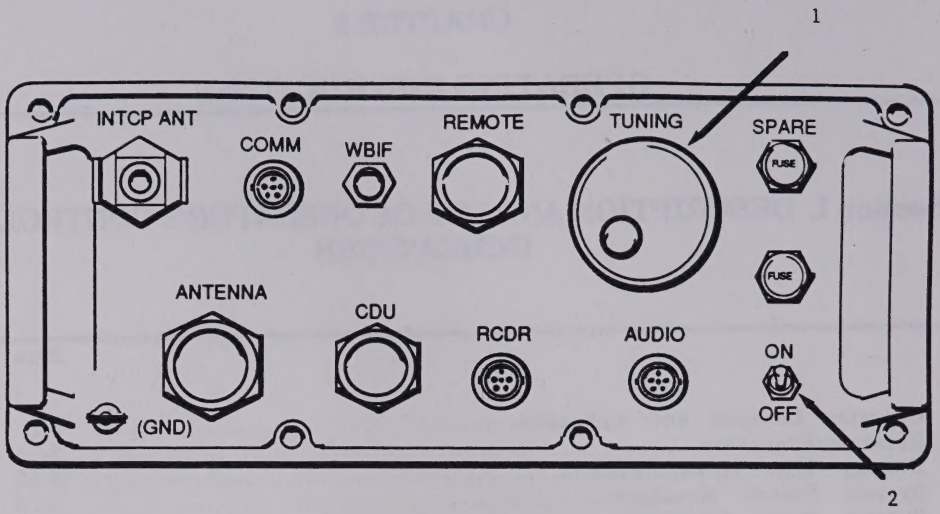

FIGURE 2-1. Receiver/Processor Controls and Indicators.

Table 2-1. Receiver/Processor Controls and Indicators.

Key	Control or Indicator	Function
1	TUNING Wheel	Allows for manual tuning of the receiver.
2	ON/OFF Switch	Applies/removes unit power.

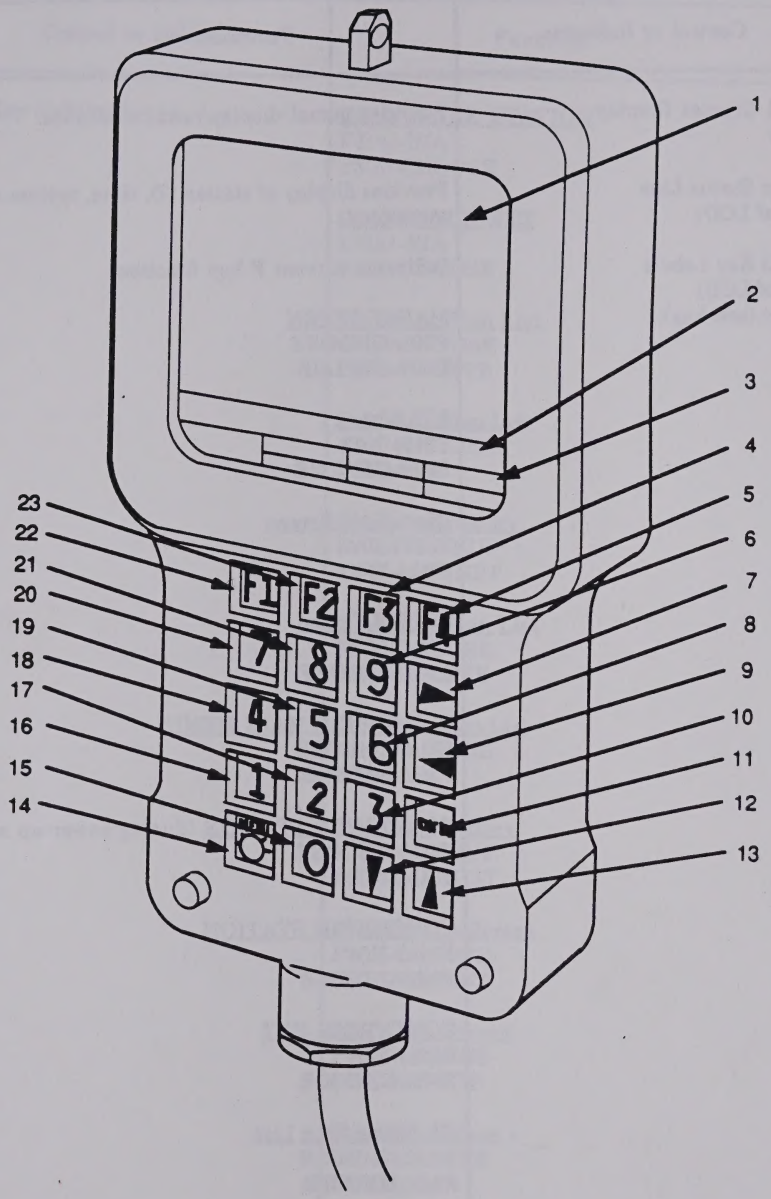

FIGURE 2-2. DU Controls and Indicators.

Table 2-2. DU Controls and Indicators.

Key	Control or Indicator	Function
1	Liquid Crystal Display (LCD)	Provides visual display/readout of data.
2	System Status Line (Part of LCD)	Provides display of station ID, time, system status and error messages.
3	F (soft) Key Labels (Part of LCD)	Indicates current F key function.
4	F3 Key (soft key)	MAIN SCREEN F3(a)-CHOOSE F3(b)-SETLOB BIT Screen F3(a)-N/A F3(b)-CHOOSE Diagnostic Screen F3(a)-N/A F3(b)-EXIT SETON Screen F3(a)-N/A F3(b)-SETOFF CONFIGURE MAIN MENU F3(a)-CHOOSE F3(b)-SETLOB CONFIGURE STATION (during power-up sequence) F3(a)-CHOOSE F3(b)-N/A CONFIGURE STATION F3(a)-N/A F3(b)-CHOOSE CONFIGURE NET F3(a)-N/A F3(b)-CHOOSE Configure Scan List F3(a)-CHOOSE F3(b)-DELETE CONFIGURE STATION (during power-up sequence) F3(a)-CHOOSE F3(b)-N/A

Table 2-2. DU Controls and Indicators-Continued

Key	Control or Indicator	Function
4	F3 Key (soft key)-cont	CONFIGURE STATION F3(a)-N/A F3(b)-CHOOSE CONFIGURE NET F3(a)-N/A F3(b)-CHOOSE Configure Scan List F3(a)-CHOOSE F3(b)-DELETE Configure Step List F3(a)-CHOOSE F3(b)-N/A Fix Entry History F3(a)-TUNEUP F3(b)-LOBHIST Configure Scan List F3(a)-CHOOSE F3(b)-DELETE Configure Step List F3(a)-CHOOSE F3(b)-N/A Fix Entry History F3(a)-TUNEUP F3(b)-LOBHIST LOB History Screen F3(a)-CHOOSE F3(b)-FIXHIST DATAFIX Screen F3(a)-CHOOSE F3(b)-SETLOB MANFIX Screen F3(a)-CHOOSE F3(b)-CALC LOB Screen F3(a)-CHOOSE F3(b)-RESUME

Table 2-2. DU Controls and Indicators-Continued

Key	Control or Indicator	Function
4	F3 Key (soft key)-cont	Scan Scanning Screen Scan Halted Screen F3(a)-CHOOSE F3(b)-SCAN Scan Paused Screen F3(a)-N/A F3(b)-HALT Scan Scanning Screen F3(a)-N/A F3(b)-HALT Step Halted Screen F3(a)-CHOOSE F3(b)-STEP Step Paused Screen F3(a)-N/A F3(b)-HALT Step Stepping Screen F3(a)-N/A F3(b)-HALT
5	F4 Key (soft key)	MAIN SCREEN F4(a)-• (decimal point) F4(b)-LOB Diagnostic Screen F4(a)-N/A F4(b)-REPEAT CONFIGURE MAIN MENU F4(a)-• (decimal point) F4(b) -LOB CONFIGURE STATION: F4(a)-N/A F4(b)-• (decimal point) CONFIGURE NET F4(a)-N/A F4(b)-• (decimal point)

Table 2-2. DU Controls and Indicators-Continued

Key	Control or Indicator	Function
5	F4 Key (soft key)-cont	Configure Scan List F4(a)-• (decimal point) F4(b)-N/A Configure Step List F4(a)-• (decimal point) F4(b)-NXTPAGE FIX Entry History F4(a)-• (decimalpoint) F4(b)-N/A
5	F4 Key (soft key)-cont	LOB History Screen F4(a)-• (decimal point) F4(b)-N/A CONFIGURE STATION (during power-up sequence) F4(a)-• (decimal point) F4(b)-EXIT DATAFIX Screen F4(a)-• (decimal point) F4(b)-RESUME MANFIX Screen F4(a)-• (decimal point) F4(b)-RESUME LOB Screen F4(a)-• (decimal point) F4(b)-LOB Scan Halted Screen F4(a)-• (decimal point) F4(b)-LOB Scan Paused Screen F4(a)-N/A F4(b)-LOB Step Halted Screen F4(a)-• (decimal point) F4(b)-LOB Step Paused Screen F4(a)-N/A F4(b)-LOB

Table 2-2. DU Controls and Indicators-Continued

Key	Control or Indicator	Function
6	9 Key	Causes display of numeric character 9 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
7	► (Right Arrow)	Moves cursor one field to right when pressed and released. When cursor on last field in line, moves cursor to first field in next line down. Repeats approx. two times a second when held pressed for approx. 2 seconds.
8	6 Key	Causes display of numeric character 6 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
9	◄ (Left Arrow)	Moves cursor one field to left when pressed and released. When cursor on first field in line, moves cursor to last field in next line up. Repeats approx. two times a second when held pressed for approx. 2 seconds.
10	3 Key	Causes display of numeric character 3 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
11	ENTER Key	Causes entered data to be processed.
12	▼ (Down Arrow)	Moves cursor one line down when pressed and released. When cursor on last line of screen, moves cursor to first line of screen. When DU backlight control mode enabled, decreases DU backlight level. Repeats approx. two times a second when held pressed for approx. 2 seconds.
13	▲ (Up Arrow)	Moves cursor one line up when pressed and released. When cursor on first line of screen, moves cursor to last line of screen. When DU backlight control mode enabled, increases DU backlight level. Repeats approx. two times a second when held pressed for approx. 2 seconds.
14	MENU ☼ key (MENU orBacklight Control Enable)	Returns system to MAIN SCREEN when pressed and released. When pressed and held for approx. 2 seconds, turns on DU backlight and enables backlight control mode. Disables DU backlight control mode if pressed when backlight control mode enabled.

Table 2-2. DU Controls and Indicators-Continued

Key	Control or Indicator	Function
15	0 Key	Turns off DU backlight and disables backlight control mode if pressed when backlight control mode enabled. Causes display of numeric character 0 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
16	1 Key	Causes display of numeric character 1 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
17	2 Key	Causes display of numeric character 2 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
18	4 Key	Causes display of numeric character 4 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
19	5 Key	Causes display of numeric character 5 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
20	7 Key	Causes display of numeric character 7 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
21	8 Key	Causes display of numeric character 8 when pressed and released. Repeats approx. two times a second when held pressed for approx. 2 seconds.
22	F1 Key (soft key)	MAIN SCREEN SHIFT (toggle) (Applies to all screens; causes highlight to shift to non-highlighted area of indication table)
23	F2 Key (soft key)	MAIN SCREEN F2(a)-EDITRCU F2(b)-MANFIX Diagnostic Screen F2(a)-N/A F2(b)-CONTINUE CONFIGURE MAIN MENU F2(a)-EDITOPS F2(b)-EDITRCU

Table 2-2. DU Controls and Indicators-Continued

Key	Control or Indicator	Function
23	F2 Key (soft key)-cont	CONFIGURE STATION F2(a)-N/A F2(b)-SAVE CONFIGURE NET F2(a)-N/A F2(b)-SAVE Configure Scan List F2(a)-N/A F2(b)-SAVE Configure Step List F2(a)-ADDRCU F2(b)-SAVE Fix Entry History F2(a)-N/A F2(b)-FIXHIST CONFIGURE STATION (during power-up sequence) F2(a)-N/A F2(b)-SAVE LOB History F2(a)-N/A F2(b)-NXTPAGE DATAFIX Screen F2(a)-SAVE F2(b)-DATAFIX MANFIX Screen F2(a)-SAVE F2(b)-MANFIX LOB Screen F2(a)-SAVE F2(b)-MANFIX Scan Halted Screen F2(a)-EDITRCU F2(b)-MANFIX

Table 2-2. DU Controls and Indicators-Continued

Key	Control or Indicator	Function
23	F2 Key (soft key)-cont	Scan Paused Screen F2(a)-N/A F2(b)-MANFIX Step Halted Screen F2(a)-EDITRCU F2(b)-MANFIX Step Paused Screen F2(a)-N/A F2(b)-MANFIX

d) The **F3**(a) and **F4**(a) functions will always change to read TUNEUP and TUNEDN, respectively, when the RCU panel is accessed and the cursor is in the frequency field.

e) If the NET is configured for DATA operations, a NET INTERRUPT will always cause the configuration to change from DATA to VOICE.

c) The **F2**(b) MANFIX function will change to read DATAFIX whenever the NET function is established in the DATA mode rather than the VOICE mode.

2-1.3. System Status Messages.

The AN/PRD-12 operational software generates status messages that are displayed to the operator in the DU status line. Table 2-3 lists and briefly describes the AN/PRD-12 status messages.

Table 2-3. System Status Messages

Message	Description
PERFORMING NFE	Indicates system is performing noise floor estimate (NFE).
NFE COMPLETE	Indicates NFE is completed.
SAVED TO EEPROM	Displayed when SAVE key pressed to indicate data has been written to electrically-erasable programmable read only memory (EEPROM).
LOB STARTED	Indicates line of bearing (LOB) measurement is started as a result of the operator pressing the LOB key.
LOB IN PROGRESS	Indicates system is measuring LOB.
LOB COMPLETE	Indicates LOB measurement is completed.
LOB SAVED	Indicates LOB has been saved to LOB history file.
SETON LOB	Indicates AN/PRD-12 is set up to monitor activity on a selected frequency and will perform LOB on that frequency when signal meets squelch criteria.
SETON ABORTED	Indicates set on LOB has been disabled by the operator.
MANFIX STARTED	Indicates manual fix calculation has been started.
MANFIX IN PROGRESS	Indicates manual fix calculation is being performed.
MANFIX COMPLETE	Indicated manual fix calculation is complete.
DATAFIX STARTED	Indicates netted fix has beenstarted by operator.
END OF DATAFIX	Indicates DATAFIX has been completed.

Table 2-3. System Status Messages - Continued

Message	Description
BGN LMRDFS MODE	Indicates AN/PRD-12 slave station has commanded a DATAFIX.
END LMRDFS MODE	Indicates AN/PRD-12 slave commanded fix has been completed.
SCANNING	When SCAN SEARCH selected, indicates AN/PRD-12 is actively scanning.
SCAN-HALTING	When HALT mode selected, indicates scanning is being stopped due to operator action, or as result of signal meeting squelch criteria.
SCAN-PAUSING	When PAUSE mode selected, indicates scanning is being stopped for programmed pause period due to signal meeting squelch criteria.
STEPPING	When STEP SEARCH selected, indicates AN/PRD-12 is actively stepping through step list.
STEP-HALTING	When HALT mode selected, indicates stepping is being stopped due to operator action, or as result of signal meeting squelch criteria.
STEP-PAUSING	When PAUSE mode selected, indicates stepping is being stopped for programmed pause period due to signal meeting squelch criteria.
NET INT MSG/NCS	Indicates to slave 1 thru 3 stations that NCS has commanded net interrupt. Switches net mode from data to voice.
NET INT MSG/S1	Indicates to NCS, slave 2, and slave 3 stations that slave 1 has commanded net interrupt. Switches net mode from data to voice.
NET INT MSG/S2	Indicates to NCS, slave 1, and slave 3 stations that slave 2 has commanded net interrupt. Switches net mode from data to voice.
NET INT MSG/S3	Indicates to NCS, slave 1, and slave 2 stations that slave 3 has commanded net interrupt. Switches net mode from data to voice.
IN VOICE MODE	Indicates operator has changed net mode from data to voice.
IN DATA MODE	Indicates operator has changed net mode from voice to data mode.
BL MODE NOW ON	Generated when MENU key pressed and held for minimum of 2 seconds. Indicates DU backlight control enabled.
EXIT BL MODE	Displayed when MENU or 0 keys pressed when DU backlight control mode enabled. Indicates backlight control mode has been disabled.

2-1.4. System Error Messages.

The AN/PRD-12 operational software generates error messages that indicate wrong operator actions and system errors during search and DF operations. Error messages are displayed to the operator in the DU status line. Table 2-4 lists and briefly describes the AN/PRD-12 status messages.

Table 2-4. AN/PRD-12 Error Messages

Message	Description
ILLEGAL ACTION	Indicates operator has entered data that is not allowed for operations being performed.
INVALID STOP FREQUENCY ENTERED	Indicates scan stop frequency is either less than start frequency, greater than 500 MHz, or greater than station configuration allows.
INVALID FREQUENCY ENTERED	Indicates frequency entered is not valid for station configuration.
TOO MANY HI PRIS	Indicates more than 20 step list entries are selected as high priority.
INVALID PAUSE DURATION	Indicates selected scan or step pause duration is greater than 99.
INVALID SCAN DATA	Displayed when attempt is made to enter scan mode with no scan band defined.
INVALID SCAN BAND	Indicates scan band selected from SCAN SEARCH screen has not been defined.
INVALID STEP LIST	Displayed when attempt is made to enter step mode with no entries in step list.
ILLEGAL ACTION IN BL MODE	Indicates attempted operation not allowed in backlight control mode.
INVALID KEY ENTERED	Indicates key pressed invalid for selected field.
UNABLE TO PERFORM DF	Indicates selected antenna(s) are not available. Check station configuration data.
MHI OVER TILT	Indicates VHF/UHF processor tilted greater than 10° from vertical, or that wind may be causing too much antenna movement.
BAD DF RESPONSE	Indicates DF baseline measurements exceed universal calibration table threshold.
IN TRANSITION - PLEASE WAIT	Indicates system is waiting to complete current operation before returning to MAIN SCREEN.

Table 2-4. AN/PRD-12 Error Messages - Continued

Message	Description
NO FIXES FOR FIX HISTORY	Indicates fix history file is empty when attempting to display file.
NO LOBS IN FIX HISTORY	Indicates no LOBs have been saved by operator. Displayed when attempting to display LOB history file.
INVALID ANGLE	Indicates invalid entry into MHI VALUE, MAG NORTH, or HF HEADING field.
BACKLIGHT MODE IS ON	Indicates backlight control already enabled.
NOT A CHOOSE FIELD	Indicates attempt to change field value using CHOOSE key when field must be entered using numeric keys.
MEASUREMENT INVALID	Indicates no signal or strong interfering signal present when performing LOB.
INCONSISTENT MEASUREMENT	Indicates collected LOB data cannot be processed.
MHI BIT ERROR	Indicates MHI failure.
NO MHI RESPONSE	Indicates MHI did not provide heading data when commanded.
ILLEGAL HEADING FROM MHI	Indicates MHI heading data out of range (0.0°-359.9°).
NO CLEARING OF EEPROM	Indicates CLEAR DATA failed.
INVALID KEY PRESS DURING SETON	Indicates key pressed invalid during SETON LOB.
UNKNOWN MSG RCVD-CHK NET	Indicates unknown message received during netted operations.
SLAVE RESPONSE TIMING ERR-CHK NET	Indicates slave response received too early or too late.
NCS RCVD UNKNOWN MSG -CHK NET	Indicates NCS received unknown message when slave response expected.
INSUFFICIENT DATA FOR FIX	Indicates minimum number of LOBs required for fix (3) or cut (2) not available.
UNABLE TO COMPUTE CUT/FIX	Indicates cut or fix calculation failed. This may be caused by parallel LOBs received from slave stations, LOBs diverging, or two or more LOBs intersecting more than 100 kilometers from the station commanding the fix.
EEP MAJOR AXIS TOO LARGE	Indicates that the major axis of the error ellipse is greater than the distance from the station commanding the fix and the calculated target location.

Section II. Preventive Maintenance Checks and Services (PMCS)

	Para	Page
General	2-2	2-16
PMCS Procedures	2-3	2-16
Special Instructions	2-4	2-17

2-2. GENERAL.

Preventive Maintenance Checks and Services (PMCS) are essential to the efficient operation of the AN/PRD-12. They prevent possible damage that might occur through neglect or failure to observe warning symptoms in a timely manner. While performing PMCS, always keep in mind the applicable WARNINGS and CAUTIONS.

a. Before you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS prior to the equipment leaving its containment area or performing its intended mission.

b. While you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS when the equipment is being used in its intended mission.

c. After you operate. Be sure to perform your after (A) PMCS after the equipment has been taken out of its mission mode or returned to its containment area.

d. If your equipment fails to operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See TM 38-750.

2-3. PMCS PROCEDURES.

Table 2-5 lists the inspections and care of your equipment required to keep it in good operating condition. Carefully follow these instructions. If you do not have the tools required to perform the procedure, notify Organizational Maintenance.

a. The **Interval** column of the PMCS table tells you when to do a certain check or service.

b. The **Item to be inspected/Procedure** column of your PMCS table tells you how to do the required checks and services. Carefully follow these instructions. If you do not have the tools, or if the procedure tells you to, have organizational maintenance do the work.

c. If your equipment does not perform as required, refer to Chapter 3 under Troubleshooting for possible problems. Report any malfunctions or failures on the proper DA Form 2024, or refer to TM 38-750. Remove assemblies or equipment, in order to perform PMCS, in accordance with this TM.

d. The **Equipment is not ready/available if** column tells when and why your equipment cannot be used. The terms "ready/available" and "mission capable" refer to the same status: Equipment is on hand and is able to perform its combat mission (see DA PAM 738-750).

2-4. SPECIAL INSTRUCTIONS.

If the AN/PRD-12 must be kept in operation for prolonged periods of time, check only those items that can be checked without disturbing operation. Make complete checks when the equipment can be shut down.

Extreme weather conditions may require PMCS to be performed more frequently.

Table 2-5. Preventive Maintenance Checks and Services.

B-Before D-During A-After

Item no.	Interval B	D	A	Item InspectedProcedure	Equipment not ready if:
1				AN/PRD-12	
	•		•	Check for completeness of equipment	
	•		•	Setup and test operate equipment for intended mission	BIT test 0 - 7 fails
2				Receiver Group	
	•		•	Check for completeness of equipment	Equipment missing
	•		•	Inspect front panel for dirt, cracks, chipped paint; damaged or missing connectors/connector covers, switches and missing fuse caps	Connectors, switches or fuse caps are damaged or missing
3				DU	
	•		•	Inspect DU for cracks, dirt, chipped paint, frayed/cracked or torn cable, cracked/broken glass, damaged cable connector, and inoperable function keys	Cracked or broken glass, damaged cable/cable connector, inoperable function keys
4				Battery Case	
	•		•	Inspect battery case and center housing for physical damage, corrosion and presence of four spring clips	Corrosion present or any spring clips missing
5				Intercept Antenna	
	•		•	Inspect for damaged threads	Threads damaged
6				Headset	
	•		•	Inspect for dirt, damaged earphones, cracked or frayed cable, damaged PTT switch, damaged connector, or damaged microphone	Headphones, PTT switch, connector or microphone damaged/inoperable
7				Antenna AS-4143/PRD-12	
	•		•	Inspect for condition. Look for dirt, cracks and chipped paint	
	•		•	Check for completeness of equipment	Equipment missing
	•		•	Inspect bag for holes, tears and mildew or dry rot	
	•		•	Inspect each antenna arm for broken dipoles and damaged connectors	Dipoles are broken or connectors are damage
	•		•	Inspect processor for dirt, cracks and damaged connectors	Connectors are damaged

Table 2-5. Preventive Maintenance Checks and Services-Continued

B-Before D-During A-After

Item no.	Interval B	D	A	Item InspectedProcedure	Equipment not ready if:
7 cont	•		•	Inspect RF/control cable for damaged connectors, cracked or torn insulation	Connectors are damaged or cable insulation torn/cracked
	•		•	Inspect mast assembly for frayed, cracked or broken guy lines and anchor, cracked/broken base plate, bent or deformed guy stakes, and mast tube cracks	Cracked or broken guy lines and anchor, base plate or cracked mast tube
				BIT Antenna	
	•		•	Inspect antenna and connector for damage	Damaged connector
8				Antenna AS-4144/PRD-12	
	•		•	Check for completeness of equipment	Equipment missing
	•		•	Inspect for condition. Look for dirt, cracks and chipped paint	
	•		•	Inspect bag for holes and tears	
	•		•	Inspect antenna bases for cracked housing, damaged or corroded connectors, damaged or corroded whip antennas, damaged cable insulation or connectors	Housing is cracked; connectors, cables or whip are damaged
	•		•	Inspect processor for cracked housing, damaged connectors or damaged antenna location placard	Housing is cracked or connectors are damaged
	•		•	Inspect location line for fraying	
				BIT Antenna	
	•		•	Inspect for damaged connector	Connector damaged
9				Perform power-up procedure IAW 2-6.2	
10				G-83/PRD-12 Battery Charger	
	•		•	Inspect G-83/PRD-12 for cracked case, bent or broken connector jacks, damaged or missing cables, missing or improper fuses. Replace G-83/PRD-12 or fuses if damaged or missing	Case is cracked, connectord broken, cables missing.
11	•		•	MT-6700/PRD-12 Electrical Equipment Mounting Base	
				Inspect for damaged clamps, damaged or missing clamp spring latches; damaged DU mount, damaged or missing DU mount spring latches	Spring latches damaged or missing
12				Perform cleaning, as required, in accordance with procedures in 3-7	

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2-5. ASSEMBLY AND PREPARATION FOR USE.

2-5.1. Site Selection.

There is one basic criteria for determining a site layout that allows optimum direction finding (DF) operations, a clear line-of-sight (LOS) to the area of interest for VHF/UHF operations.

For effective VHF/UHF monitoring, the antenna group must have clear LOS to the target area of interest, because VHF/UHF signals are blocked by obstructions. The LOS must be free of obstructions, such as trees, mountains, and buildings, that extend above the deployed antenna group in the path of the target area. There should also be clear LOS between the NCS and all other stations for effective use of the data/voice link.

The LOS roughly corresponds to what an operator could see if the operator were sitting at the top of the antenna group. The LOS range in miles may be calculated by using the following formula:

$LOS = \sqrt{2H}$, where
LOS = range in miles;
H = the antenna height plus the difference in altitude between the two locations.

If the AN/PRD-12, with its 20 feet in antenna height, were sitting on a hill 100 feet in height above the area of interest, then;
LOS = $\sqrt{2X120}$; approximately 15.5 miles .

2-5.2. Station Deployment.

2-5.2.1. HF Only Mission.

NOTE

Perform this task when the mission consists of HF operations only. Refer to the HF antenna location instructions on the HF processor housing while performing this task. Two people are required to perform this task.

a. Person A: Remove AS-4144/PRD-12 from transport pack and carry to installation area.
Person B: Remove OL-470/PRD-12 from transport pack and carry to installation area.

b. Person A: Loosen HF antenna bag straps and open bag.

c. Person A: Remove HF processor from HF antenna bag to gain access to HF antenna location instructions.

d. Person A: Remove ground stakes from HF antenna bag and carry to first antenna position.
Person B: Remove location line from HF antenna bag and carry to first antenna position.

e. Person A: Using 16-ounce ball peen hammer, drive ground stake into ground at first antenna position.
Person B: Stretch out location line in the South direction.

f. Person A: Hold location line end at first ground stake.
Person B: Stretch location line to second antenna position and align location line with magnetic North using a compass (see Figure 2-3).

g. Person A: Using 16-ounce ball peen hammer, drive ground stake at second antenna position.

h. Person A: Hold location line at first ground stake.
Person B: Scribe an arc at approximate location of third antenna using location line as a compass as shown in Figure 2-4.

i. Person B: Hold location line at second ground stake.
Person A: Scribe an arc, intersecting first arc, using location line as a compass as shown in Figure 2-5.

j. Person B: Using 16-ounce ball peen hammer, drive ground stake into ground at point where arcs intersect.
Person A: Place location line in HF antenna bag.

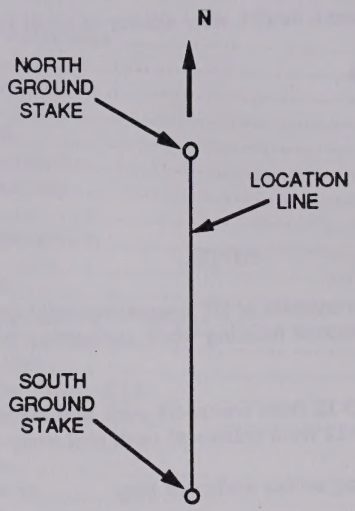


FIGURE 2-3. HF North-South Baseline Setup Diagram.

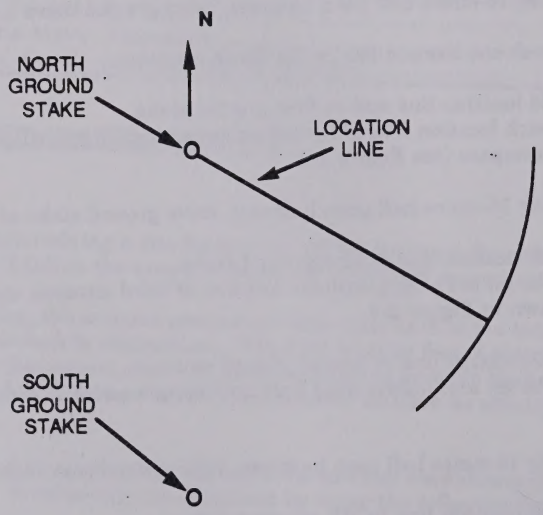


FIGURE 2-4. Third HF Ground Stake Location-First Step.

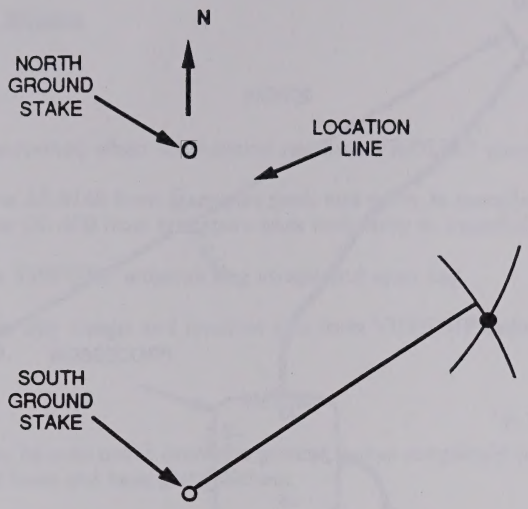


FIGURE 2-5. HF Third Ground Stake Location-Final Step.

k. Person A: Place HF processor at approximate center of triangle formed by ground stakes.
Person B: Remove HF antenna bases from HF antenna bag. Insert a HF antenna base into each ground stake and extend HF antenna.

l. Person A: Remove HF antenna cables from HF antenna bag.
Person B: Assist person A laying out HF antenna cables.

NOTE

HF processor connector A3A1J2 is for VHF/UHF operations only. During HF operations, the tethered connector cap must be secured to connector A3A1J2.

m. Person A: Connect HF antenna cables to HF processor A3A1J3 thru A3A1J5 as shown in Figure 2-6.
Person B: Connect HF antenna cables to HF antenna bases.

n. Person A: Remove HF/control cable W2 from HF antenna bag and lay out.
Person B: Connect HF/control cable to W2 to HF processor A3A1J1.

o. Person A: Connect HF/control cable W2 to receiver/processor front panel ANTENNA jack.

p. Person A: Connect headset to receiver/processor front panel AUDIO jack.

q. Person A: Connect DU to receiver/processor front panel CDU jack.

r. Person A: Thread intercept antenna into receiver/processor front panel INTCP ANT lug and tighten hand tight.

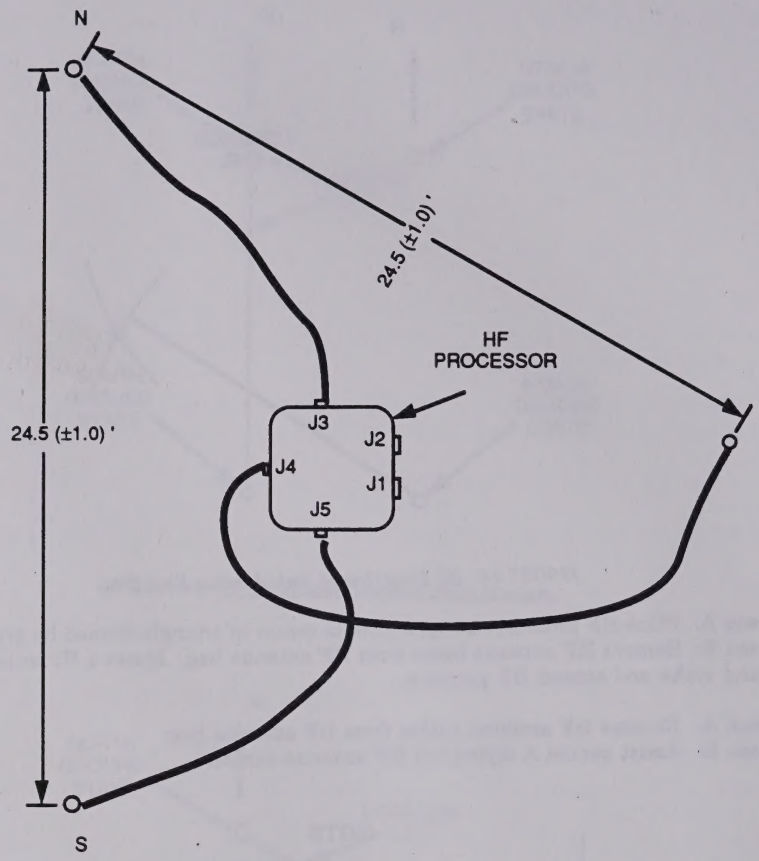


FIGURE 2-6. AS-4144/PRD-12 Setup Diagram.

s. Person A: Referring to figure 2-7, connect one end of TSEC/KY-57 interface cable (CX-13073/U) to receiver/processor front panel COMM connector and connect other end to KY-57 AUDIO connector.
Person B: Referring to figure 2-7, connect one end of radio interface cable to radio PWR connector and connect other end to KY-57 RAD connector.

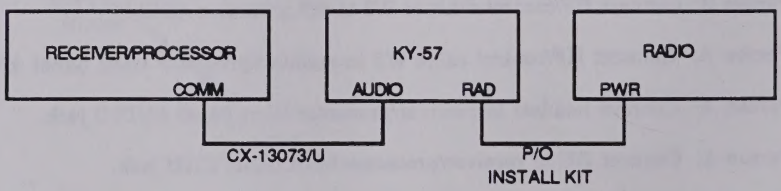


FIGURE 2-7. Receiver/Processor-Radio-KY-57 Interconnect Diagram.

t. Person A: Perform Power-up, paragraph 2-6.2.

2-5.2.2. *VHF/UHF Only Mission.*

NOTE

This procedure is performed when the mission requires VHF/UHF operations only.

a. Person A: Remove AS-4143 from transport pack and carry to installation area.
Person B: Remove OL-470 from transport pack and carry to installation area.

b. Person A: Loosen VHF/UHF antenna bag straps and open bag.

c. Person A: Remove guy stakes and location line from VHF/UHF antenna bag and give two stakes to person B.

NOTE

In the following steps, be sure not to drive the ground stakes completely into the ground as you must later connect the guy lines and base plate to them.

d Person A: Drive first guy stake using 16-ounce ball peen hammer.

e. Person A: Hold location line at first guy stake position.
Person B: Take one end of location line, and hammer, from person A and stretch location line to position of second guy stake as shown in Figure 2-8.

f. Person B: Drive second guy stake at end of location line using 16-ounce ball peen hammer.

g. Person B: Move location line to approximate position of third guy stake and scribe an arc using location line as a compass as shown in Figure 2-9.

h. Person A: Move location line from first guy stake position to second guy stake position and hold.
Person B: Scribe an arc on ground at end of location line intersecting with arc drawn in step g as shown in Figure 2-10.

i. Person B: Drive third guy stake at point where arcs intersect using 16-ounce ball peen hammer.
Person A: Retrieve and stow location line.

j. Person A: Locate approximate center (intersection point) of triangle and drive center stake as shown in Figure 2-11.

k. Person A: Remove mast and mast base plate from VHF/UHF antenna bag and move to center stake position.
Person B: Remove VHF and UHF support arms from VHF/UHF antenna bag.

l. Person A: Holding the small end of the mast and facing the mast base, extend the smallest mast section. Lock mast section by turning cw until horizontal black lines are completely exposed and vertical black lines are aligned. Repeat process for remainder of mast.

m. Person A: Attach base plate to mast base, via the quarter-turn base plate fastener. Loop base plate line over center ground stake.
Person B: Attach one each UHF feed arm to VHF feed arm.

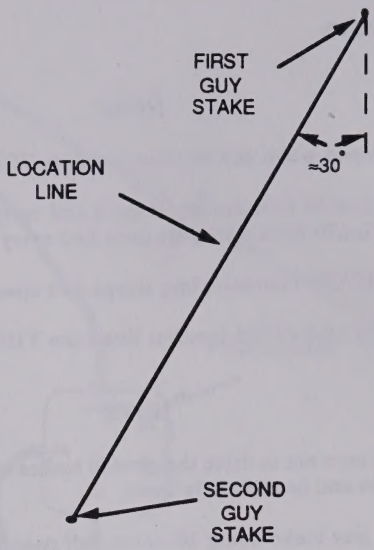


FIGURE 2-8. Second Guy Stake Position.

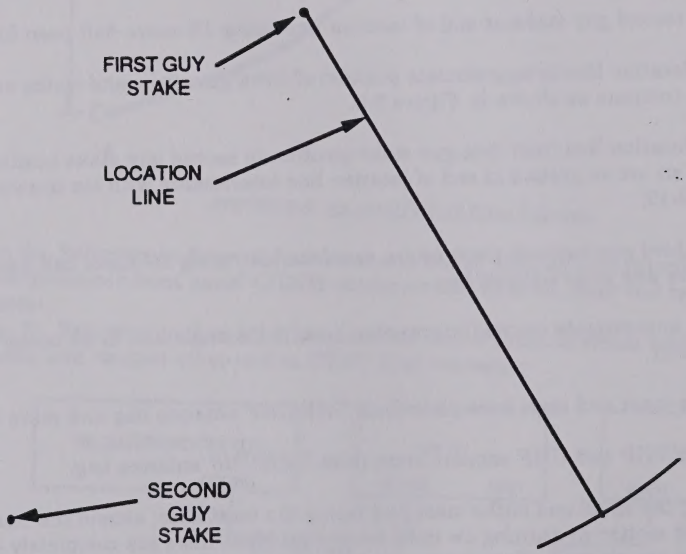


FIGURE 2-9. Third Guy Stake Position-Initial Step.

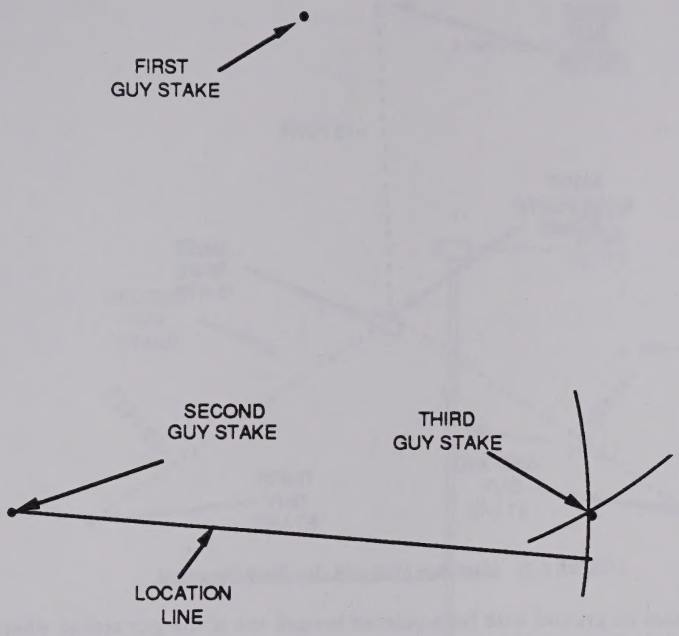


FIGURE 2-10. Third Guy Stake Position-Final Step.

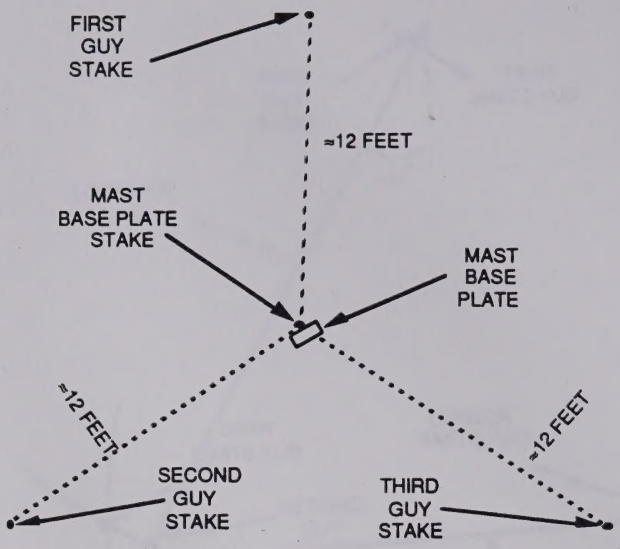


FIGURE 2-11. Mast Base Plate and Guy Stake Placement.

n. Person A: Lay mast on ground with base pointed toward one of the guy stakes when sighted down the mast as shown in Figure 2-12.
Person B: Remove guy lines from VHF/UHF antenna bag and take to mast.

NOTE

Top guy lines are identified by three notches cut into the tensioner handles. Middle guy lines are identified by two notches cut into the tensioner handles.

o. Person A: Attach three top guy lines each to the mast head and three middle guy lines to middle guy ring as shown in Figure 2-13.
Person B: Assist person A.

p. Person A: Remove VHF/UHF RF processor from antenna bag and attach to mast head using three 1/4 turn fasteners.
Person B: Carry VHF/UHF antenna support arms to mast head area.

q. Person B: Extend UHF and VHF antennas taking care to grasp antennas near the swivel joints.
Person A: Support mast on shoulder and assist person B.

r. Person B: Remove dust caps from RF processor and attach VHF support arms to RF processor jacks J2 through J5.
Person A: Assist person B while still supporting mast on shoulder.

s. Person B: Remove VHF/UHF control cable and BIT antenna from VHF/UHF antenna bag and carry to mast head area.

t. Person B: Connect P1 end of control cable to processor jack J1 and BIT antenna to jack J6.

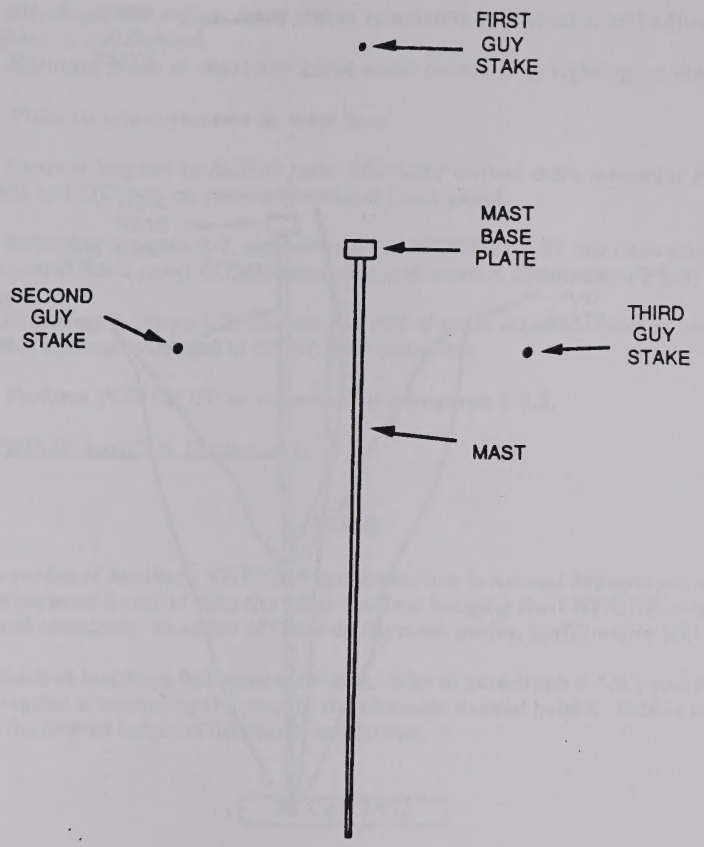


FIGURE 2-12. Mast Layout Diagram.

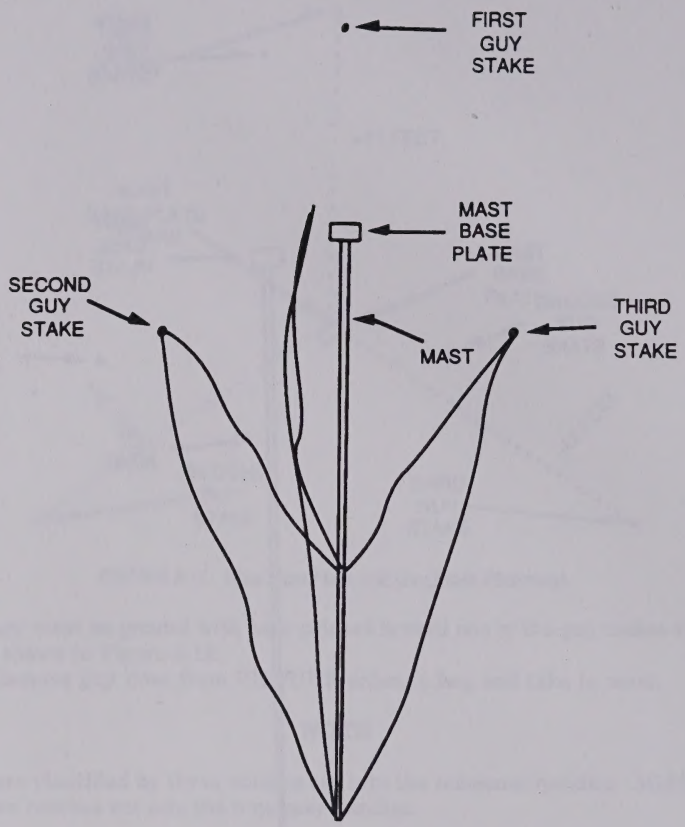


FIGURE 2-13. Guy Line Layout Diagram.

WARNING

Failure to maintain positive control of mast when raising or lowering could cause serious personal injury or equipment damage.

u. Person B: Taking care not to entangle the guy lines, wrap VHF/UHF control cable around mast three times while laying out cable along mast.

v. Person B: Grasp guy lines for the stake that the mast base is pointing to.
Person A: Grasp mast firmly with both hands holding mast slightly above your head.

w. Person B: Maintain a positive strain on mast guys.
Person A: Walk mast to the vertical.

x. Person B: Attach guys to stakes, drive stakes completely into ground, and adjust tension to maintain mast in the vertical.
Person A: Maintain grasp on mast and guide assist person B by sighting up the mast.

y. Person B: Place receiver/processor at mast base.

z. Person B: Connect headset to AUDIO jack, VHF/UHF control cable connector P2 to ANTENNA jack, ID-2465 to **CDU** jack on receiver/processor front panel.

aa. Person A: Referring to figure 2-7, connect one end of TSEC/KY-57 interface cable (CX-13073/U) to receiver/processor front panel COMM connector and connect other end to KY-57 AUDIO connector.
Person B: Referring to figure 2-7, connect one end of radio interface cable to radio PWR connector and connect other end to KY-57 RAD connector.

ab. Person A: Perform POWER UP as described in paragraph 2-6.2.

2-5.2.3. AS-4143/PRD-12 Auxiliary Deployment.

NOTE

There are two modes of auxiliary VHF/UHF operation: one is normal deployment with the mast set to some height between 6 and 17 feet; the other involves hanging the VHF/UHF antenna from a tree or other elevated structure. In either of these deployment modes, performance will be degraded.

a. For deployment at less than full mast extension, refer to paragraph 2-5.2.2 and perform all steps with the exception of extending the mast to the alternate desired height. Extend the upper section of the mast to the desired height of between 6 and 20 feet.

WARNING

Do not stand directly under the antenna array when it is deployed by hanging on a line. Serious personal injury and equipment damage may occur if the antenna should fall during operation.

b. For deployment by hanging the antenna array from a tree or other elevated structure, proceed as follows.

(1) Person A: Tie the free end of two guy lines together.

(2) Person A: Using the guy line assembled in the previous step, make four 18 inch loops and tie a knot in the loop bundlenear the long end of the line (figure 2-14).
Person B: Remove RF processor, RF control cable W1, three guy stakes, and both the VHF and UHF antenna arms from the antenna bag.

(3) Person A: While holding one end of a line, deploy the other end over a tree branch or other elevated structure.
Person B: Unfold and connect VHF and UHF antenna arms.

(4) Person A: Referring to figure 2-14, insert the RF processor into the guy line loop bundle.
Person B: Attach VHF/UHF antenna arms to RF processor.

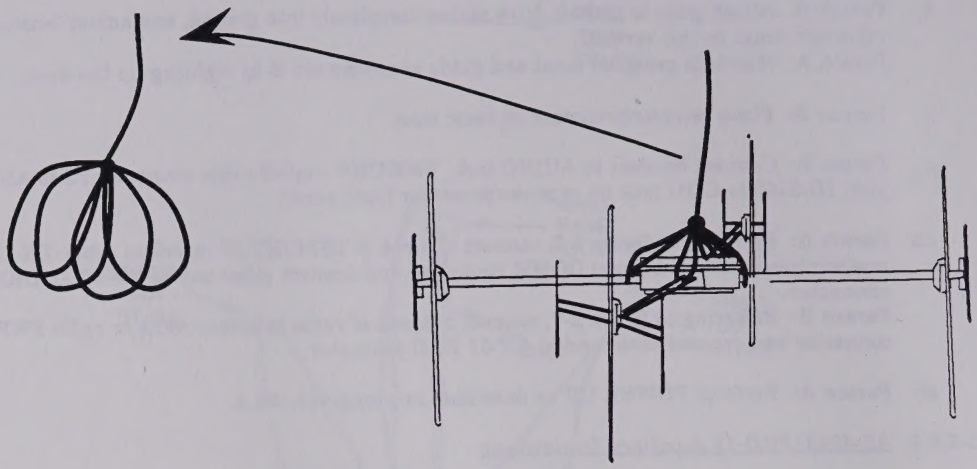


FIGURE 2-14. Auxuliary Deployment Diagram.

(5) Person A: Support processor/antenna array and connect RF control cable W1 to processor connector J1.
Person B: Tie one end of a second line to one of the antenna arms; tie one end of a third line to the opposing antenna arm.

(6) Person A: Hoist the array far enough off the ground to allow the array to be oriented horizontally.

CAUTION

Take care to not put too much tension on the guy lines tied to the support arms. Excess tension could break the arms.

(7) Person A: Hoist the array to the desired operational elevation.
Person B: Using 16-ounce ball peen hammer, drive three guy stakes into ground; one in line with each of the secured, opposing support arms and one directly beneath the VHF/UHF processor.

(8) Person A: Secure the free end of the line, tied to the center of the antenna array, to the guy stake in line with the array center and remove all slack.
Person B: Secure the free end of the lines tied to the support arms to the other guy stakes and remove all slack.

2-5.2.4. Combined HF/VHF/UHF Mission.

NOTE

This task is performed when the mission requires both HF and VHF/UHF operations.

CAUTION

When erecting VHF/UHF antenna, personnel should be careful not to trip or step on HF antenna.

a. Refer to paragraph 2-5.2.1 and perform steps a through t.

NOTE

When in the combined HF/VHF/UHF mission mode, step z of paragraph 2-5.2.2 should read "Connect VHF/UHF control cable W1 connector P2 to HF processor connector A3A1J2."

b. Refer to paragraph 2-5.2.2 and, except for the OL-470 portion of step 1 and all of step z, perform steps a through ab.

2-5.2.5. Vehicle Deployment.

NOTE

Organizational Maintenance must install Electronic Equipment Mounting Base MT-6700/PRD-12 in the vehicle prior to performing this procedure.

a. On receiver/processor, release four spring clips securing battery case on center housing assembly and remove battery case.

b. Place G-83/PRD-12 Battery Charger on center housing assembly and secure using four spring clips.

c. Place receiver/processor with battery charger installed in MT-6700/PRD-12.

d. Secure receiver/processor in MT-6700/PRD-12 by fastening four receiver/processor mounting strap spring clips.

e. Connect DU to receiver/processor front panel **CDU** jack.

f. Place DU in its MT-6700/PRD-12 mounting location and secure using two clamps.

g. Connect battery charger power input (AC or DC) cable connector P1 to battery charger connector J1; connect battery charger power input (AC or DC) cable connector P2 to the vehicle power source.

h. Connect battery charger cable connector P1 to battery charger connector J2.

i. Connect battery charger cable connector P2 to battery case assembly connector.

j. Thread intercept antenna into receiver/processor front-panel INTCP ANT lug.

NOTE

Antennas AS-4143/PRD-12 (VHF/UHF) and AS-4144/PRD-12 (HF) must be installed within five feet of the vehicle in order for cables to reach. Refer to figure 2-7 for radio and KY-57 cable interconnection with receiver/processor.

k. For antenna set-up procedures, refer to paragraph 2-5.2.1 for AS-4144/PRD-12, and paragraph 2-5.2.2 for AS-4143/PRD-12.

l. Proceed to paragraph 2-6.2, Power-up.

2-6. INITIAL ADJUSTMENTS, DAILY CHECKS, AND SELF TESTS.

Initial adjustments consist of ensuring that the AN/PRD-12 contains adequately-charged battery(s). Perform the procedures in paragraph 2-6.1 to remove and replace battery(s).

Applying power to the AN/PRD-12 requires you to enter station configuration and location data, as well as perform the built-in test (BIT). Perform the procedures in paragraph 2-6.2 to power-up, configure, and test the AN/PRD-12.

If at any time you suspect that the AN/PRD-12 is not working properly, perform the procedures in paragraph 2-6.3 to run BIT.

2-6.1. Remove and Replace Batteries.

2-6.1.1. Removal.

WARNING

A lithium-sulfur dioxide (Li-SO_2) battery used with the AN/PRD-12 contains pressurized sulfur dioxide (SO_2) gas. The gas is toxic, and the battery MUST NOT be abused in any way which may cause the battery to rupture.

WARNING

DO NOT heat, short circuit, crush, puncture, mutilate, or disassemble batteries.

WARNING

DO NOT USE any battery which shows signs of damage, such as bulging, swelling, disfigurement, brown liquid in the plastic wrap, a swollen plastic wrap, etc..

WARNING

DO NOT test Li-SO_2 batteries for capacity.

WARNING

DO NOT recharge Li-SO_2 batteries. Lithium based batteries may explode during recharging, causing severe personal injury and/or equipment damage.

CAUTION

DO NOT dispose of lithium batteries with ordinary trash/refuse. Turn-in batteries to your local serving Defense Reutilizing and Marketing Office (DRMO).

CAUTION

Only use batteries which have been authorized for this equipment.

CAUTION

To prevent possible damage to the equipment, ensure that front panel assembly A1A10 power switch is set to OFF before disconnecting cables or removing assemblies.

a. Replace the battery if it shows signs of damage or if it does not operate the equipment properly.

b. Set front panel power **ON/OFF** switch to **OFF**.

NOTE

The battery case is designed to accommodate BA-5598, BA-4386, and BB-586 batteries. BA-5598 is a lithium-based battery. BA-4386 is a magnesium-based battery. BB-586 is a rechargeable nickel-cadmium (NiCad) battery. The AN/PRD-12 uses two BA-5598 batteries, or one BB-586 or BA-4386 battery.

c. Release four spring clips securing battery case to center housing and remove battery case .

d. Disconnect battery(s) from center housing rear-panel jack(s).

e. Disposition of unserviceable lithium batteries must be through the local servicing Defense Reutilizing and Marketing Office (DRMO). Coordinate disposition with your local Installation Environmental Office and DRMO.

2-6.1.2. Installation.

NOTE

The center housing has two rear-panel connectors. These connectors are wired in parallel to accommodate the use of all three battery types. If BA-5598 batteries are used, both connectors are used. Only one connector is used when a BB-586 or BA-4386 battery is used.

a. Connect battery(s) to center housing rear panel connector(s).

b. Place battery case over battery(s) and secure using four spring clips.

c. Proceed to paragraph 2-6.2, Power-up.

2-6.2. Power-up.

The AN/PRD-12 performs a power-up sequence each time the front-panel ON/OFF switch is turned ON. At initial power-up, system software is loaded from EEPROM and BIT software is called and automatically executed. AUTOBIT A tests the digital processor and receiver circuitry. Since AUTOBIT B tests the antennas, the system software must know which antennas are available. Upon completion of AUTOBIT A, the DU automatically enters the station configuration mode. Once the station configuration information is entered and saved, AUTOBIT B is automatically run to test the antennas. Upon completion of AUTOBIT B, the MAIN SCREEN is accessed and the station is ready for mission operation. Perform the power-up sequence as follows:

a. Set front panel power **ON/OFF** switch to **ON** and AUTOBIT A (Figure 2-15) runs automatically.

NOTE

As each BIT routine is completed successfully, the DU status line displays the test name, and alternately displays IN PROGRESS and TEST PASSED.

NOTE

BIT - AUTOBIT A screen is displayed within 20 seconds of power-up. If the DU display remains blank or turns black, notify Organizational Maintenance that you have a power-up failure. BIT-FAILED is displayed in the status line and the diagnostic screen (Figure 2-16) is displayed when a failure is detected. Notify Organizational Maintenance of all BIT failures.

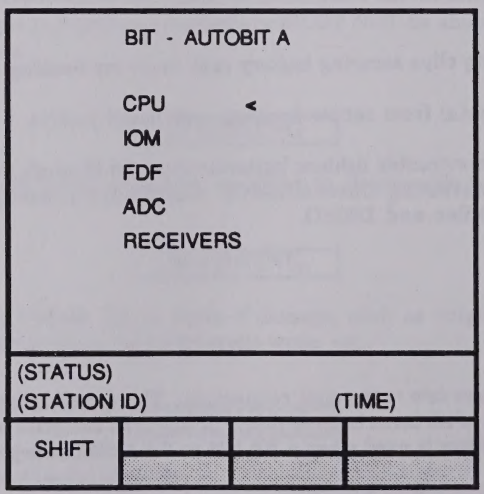


FIGURE 2-15. BIT-AUTOBIT A Screen.

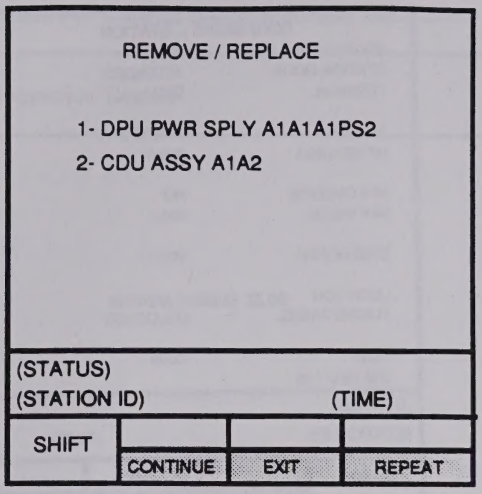


FIGURE 2-16. BIT Diagnostic Screen.

NOTE

DU backlighting increases AN/PRD-12 power consumption significantly. If backlighting is not required, turn it off to ensure maximum battery life.

b. When CONFIGURE STATION menu appears (Figure 2-17), set DU backlighting by pressing and holding **MENU/BACKLIGHTING** key for a minimum of 2 seconds to enable backlight control.

c. Press either **0** key to turn backlighting OFF, or Up/Down Arrows to select desired backlighting level.

d. Press **F1** and then **F3** to select desired numerical value (0, 1, 2, or 3) for station identification.

e. Using Down Arrow key, move cursor to STATION MODE field and press **F3** to select either ATTENDED or UNATTENDED mode.

f. Using Down Arrow key, move cursor to TERMINAL field and press **F3** key to select either DU or REMOTE.

g. Using Down Arrow key, move cursor to ANTENNA field and press **F3** key until desired antenna configuration (HF/WHIP, V/UHF/WHIP, HF/V/UHF, or WHIP) is selected.

h. Using Down Arrow key, move cursor to HF HEADING field and enter HF antenna subsystem reference azimuth to nearest tenth of degree (as determined in HF set-up, paragraph 2-7.2.1).

i. Using Down Arrow key, move cursor to MHI OVERIDE field and press **F3** key to select YES or NO.

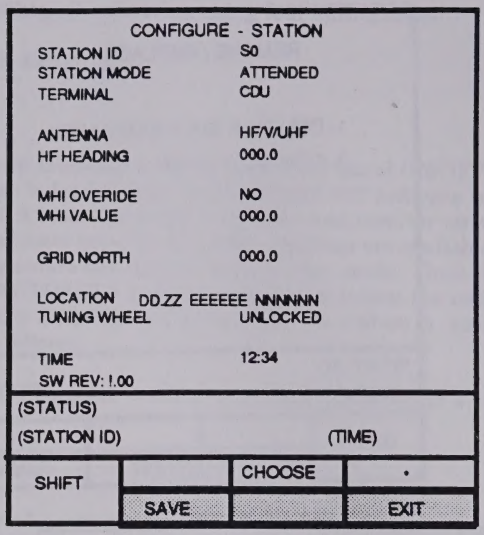


FIGURE 2-17. CONFIGURE - STATION Screen.

NOTE

If MHI OVERIDE is set to NO, skip next step. If MHI OVERIDE is set to YES, you must determine VHF/UHF antenna orientation with respect to magnetic North using a compass.

j. Using Down Arrow key, move cursor to MHI VALUE field and enter MHI azimuth to nearest tenth of degree.

k. Using Down Arrow key, move cursor to GRID NORTH field. Enter the difference between magnetic north and true north, to the nearest 0.1 degree, as indicated on the declination diagram of the map in use. This value must be entered as a positive number.

l. Using Down Arrow key, move cursor to LOCATION field and enter UTM datum numeric value using numeric keys. See table 2-6 for the datum for the geographic region you are operating in.

m. Using Right Arrow key, move cursor to map sheet number field and enter two-digit map sheet number using numeric keys.

n. Using Right Arrow key, move cursor to map sheet letter field then select map sheet letter by pressing **F3** key until desired alpha character is displayed.

Table 2-6. Universal Transverse Mercator Datum List

Geographic Region	Datum
Adindan	1
ARC 1950	2
Austrailian Geodetic	3
Bukit Rimpah	4
Camp Area Astro	5
Chatham Observatory 1950	6
Djakarta	7
European	8
Geodetic Datum 1949	9
Ghana	10
Guam 1963	11
G. Segara	12
Herat North	13
Hjorsey 1955	14
Hu-Tzu-Shan	15
Indian	16
Keratu (Malayan Revised Tiangulation)	17
Liberia 1964	18
Ascension Island Astro 1958	19
Canton Island Astro 1966	20
Johnston Island Astro 1961	21
Wake Island Astro 1952	22
Luzon	23
Montjong Lowe	24
Nigeria	25
North American 1927	
CONUS	26
Alaska and Canada	27
Maui (Old Hawiian)	28
Oahu (Old Hawiian)	29
Kauai (Old Hawiian)	30
Ordinance Survey of Gt. Britain 1936	31
Qornog	32
Sierra Leone 1960	33
WGS-72 Special	34
Provisional South America 1956	35
Creggo Alegre	36
Campo Inchauspe	37
Chua Astro	38
Yacare	39
Tananarive Observatory 1925	40
Tambalai	41
Tokyo Wake-Eniwetok	42
Kwajalein Atoll	43
Wake Island	44
Eniwetok Atoll	45
WGS-72	46

NOTE

The Easting and Northing fields are six digits in length and are right justified so only those digits that are required need be entered. For example, entering 123 followed by ENTER or an arrow key in either field results in 000123 being displayed.

o. Using Right Arrow key, move cursor to Easting field and enter Easting value using numeric keys.

p Using Right Arrow key, move cursor to Northing field and enter Northing value using numeric keys.

q. Using Down Arrow key, move cursor to TUNING WHEEL field and press **F3** to select either LOCKED or UNLOCKED.

r. Using Down Arrow key, move cursor to TIME field and enter current hour (24-hour clock) using numeric keys.

s. Using Right Arrow key, move cursor to minutes field and enter current minutes using numeric keys.

t. Verify that station configuration is correct, then press **F1** and **F2** to save configuration to EEPROM.

u. Press **F4** and AUTOBIT B (Figure 2-18) runs automatically.

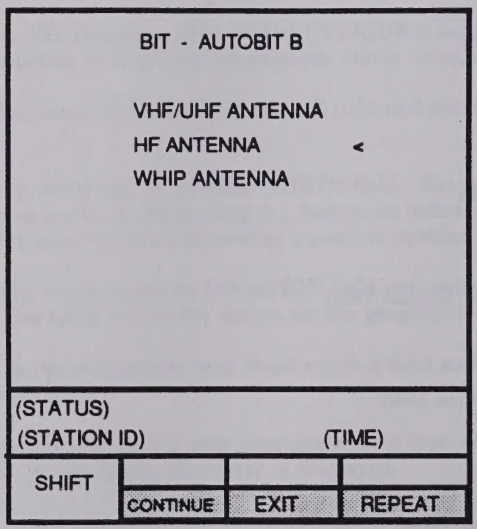


FIGURE 2-18. BIT-AUTOBIT B Screen.

NOTE

If AUTOBIT B runs successfully, AUTOBIT B PASSED will be displayed in the status line followed by the MAIN SCREEN (Figure 2-19). If AUTOBIT B fails, take note of failure and notify Organizational Maintenance. If performing a HF mission, VHF and UHF will show as failures.

NOTE

AUTOBIT B may indicate failures as a result of interference on the test signal frequencies. If AUTOBIT B fails, tune the receiver to a known signal (radio station, weather broadcast, etc.) and measure its LOB. If the AN/PRD12 will measure the LOB to the signal emitter, the AN/PRD-12 is operating properly. It may be necessary to try two or three known signals. Call Organizational Maintenance if the AN/PRD-12 will not measure the LOB to a known signal emitter.

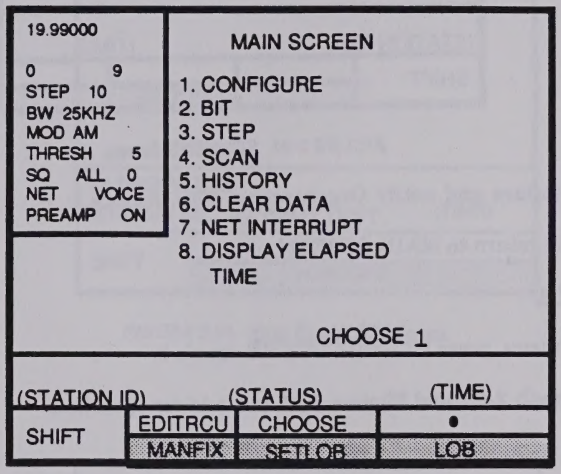


FIGURE 2-19. MAIN SCREEN Display.

2-6.3. Operator Initiated BIT.

NOTE

Built-in test (BIT) runs automatically upon power up (paragraph 2-6.2). The following steps are used to run BIT after station initialization has been completed. BIT is called from the MAIN SCREEN.

NOTE

Only run the BIT associated with your specific set-up.

a. From MAIN SCREEN (Figure 2-19), press **F1** key, press **F3** key until CHOOSE equals 2, then press **ENTER**. BIT MENU (Figure 2-20) is displayed.

b. Press **F3** until desired BIT routine is selected, then press **ENTER**. IN PROGRESS is displayed in status line while selected BIT routine is running. After successful completion of selected BIT routine, TEST PASSED is displayed in status line. If a failure is detected, diagnostic screen (Figure 2-15) is displayed indicating a list of the items that may have caused the BIT failure.

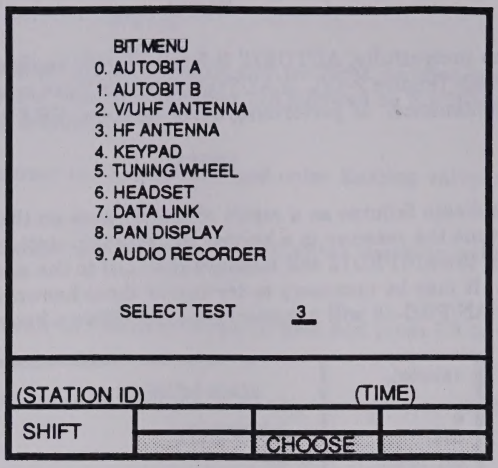


FIGURE 2-20. BIT MENU Screen.

c. Take note of failure and notify Organization Maintenance.

d. Press MENU to return to MAIN SCREEN.

2-6.3.1. Run Auto BIT A.

a. From the BIT menu, press F3 until CHOOSE equals 0.

b. Refer to paragraph 2-6.2 and Figures 2-15 and 2-16 for operation.

2-6.3.2. Run Auto BIT B.

a. From the BIT menu, press F3 until CHOOSE equals 1.

b. Refer to paragraph 2-6.2 and Figure 2-18 for operation.

2-6.3.3. Run V/UHF Antenna BIT.

a. From the BIT menu, press F3 until CHOOSE equals 2.

b. If BIT encounters an error, a diagnostic screen similar to Figure 2-16 is presented; otherwise default to BIT MENU screen.

2-6.3.4. Run HF Antenna BIT.

a. From the BIT menu, press F3 until CHOOSE equals 3.

b. If BIT encounters an error, a diagnostic screen similar to Figure 2-16 is presented; otherwise default to BIT MENU screen.

2-6.3.5. Run Keypad BIT.

a. From the BIT menu, press F3 until CHOOSE equals 4.

b. Figure 2-21 presents the first keypad BIT screen; Figure 2-22 the second screen and Figure 2-23 presents the third screen.

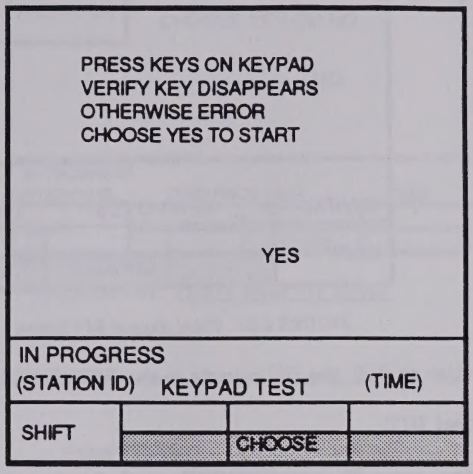


FIGURE 2-21. First Keypad BIT Screen.

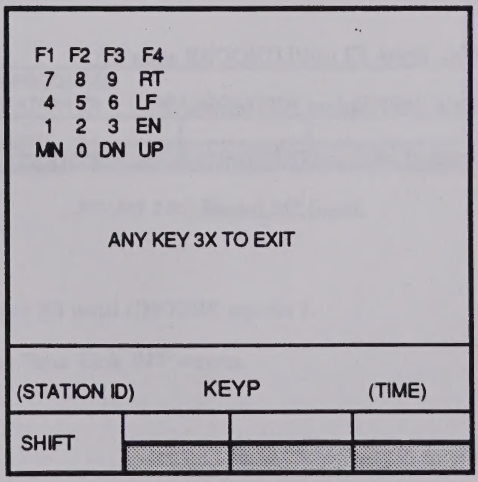


FIGURE 2-22. Second Keypad BIT Screen.

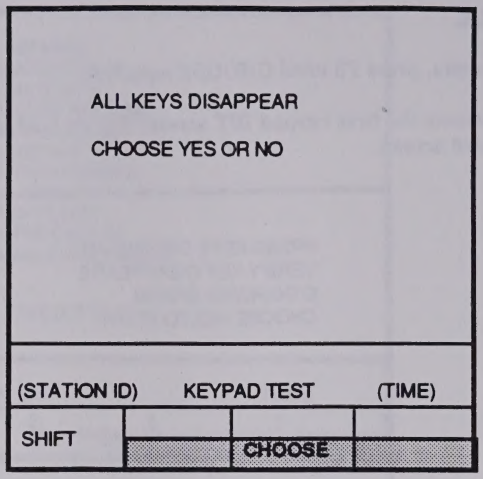


FIGURE 2-23. Third Keypad BIT Screen.

c. Following completion of BIT, the DU reverts to the BIT MENU.

2-6.3.6. Run Tuning Wheel BIT.

a. From the BIT menu, press F3 until CHOOSE equals 5.

b. Figure 2-24 presents the Tuning Wheel BIT screen.

c. Following completion of BIT, the DU reverts to the BIT MENU.

2-6.3.7. Run Headset BIT.

a. From the BIT menu, press F3 until CHOOSE equals 6.

b. Figure 2-25 presents the Headset BIT screen.

c. Following completion of BIT, the DU reverts to the BIT MENU.

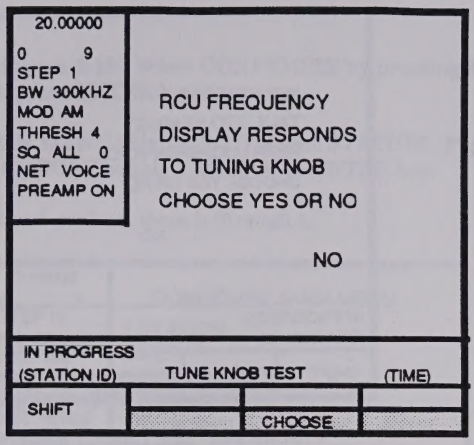


FIGURE 2-24. Tuning Wheel BIT Screen.

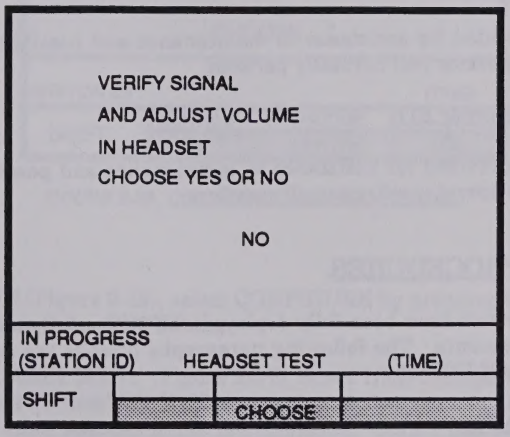


FIGURE 2-25. Headset BIT Screen.

2-6.3.8. Run Data Link BIT.

a. From the BIT menu, press F3 until CHOOSE equals 7.

b. Figure 2-26 presents the Data Link BIT screen.

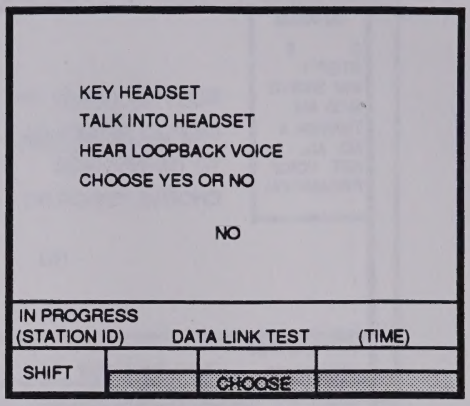


FIGURE 2-26. Data Link BIT Screen.

c. Following completion of BIT, the DU reverts to the BIT MENU.

2-6.3.9. Run Pan Display BIT.

Pan Display BIT is provided for assistance in maintenance and possible future configurations. This is not a routine that the operator will normally perform.

2-6.3.10. Run Audio Recorder BIT.

Audio Recorder BIT is provided for assistance in maintenance and possible future configurations. This is not a routine that the operator will normally perform.

2-7. OPERATING PROCEDURES.

After all stations in a system have been fully deployed and successfully tested, the system will be ready to carry out mission assignments. The following paragraphs provide the information and procedures required to operate the AN/PRD-12.

2-7.1. General Information.

AN/PRD-12 operation consists of: station initialization; receiver control unit (RCU) operation; search (manual and automatic); intercept; and direction finding (DF).

2-7.2. Station Initialization.

During this phase of operation, the AN/PRD-12 is set up for networking. You must enter your station location, and the location of each station in the network before netted operations can be accomplished. The AN/PRD-12 is initialized as either the network control station (NCS), or as a slave station. The operating mode for each station should be determined before mission deployment. The procedures in 2-7.2.1 are performed to verify or change your station configuration. Perform the procedures in 2-7.2.2 to initialize your station as the NCS. To initialize your station as a slave station, perform the procedures in 2-7.2.3.

2-7.2.1. Configure Station.

a. From MAIN SCREEN (Figure 2-19), select CONFIGURE by pressing **F1** key, press **F3** key until CHOOSE equals 1, then press ENTER key.

b. From CONFIGURE MAIN MENU (Figure 2-27), select STATION (Figure 2-17) by pressing F1 key, press **F3** key until CHOOSE equals 1, then press ENTER key.

c. Refer to paragraph 2-6.2 and perform steps b through t.

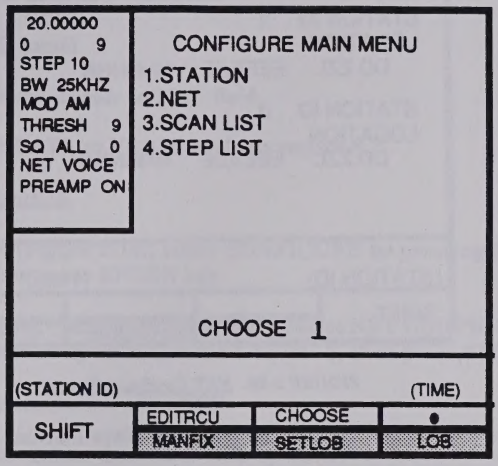


FIGURE 2-27. CONFIGURE MAIN MENU Screen.

2-7.2.2. NCS Initialization.

a. From MAIN SCREEN (Figure 2-19), select CONFIGURE by pressing **F1** key, press **F3** key until CHOOSE equals 1, then press **ENTER** key.

b. From CONFIGURE MAIN MENU (Figure 2-27), select NET Configure screen (Figure 2-28) by pressing **F1** key, press **F3** until CHOOSE equals 2, and then pressing **ENTER** key. STATION IDs and LOCATIONs of other stations in net are displayed. Cursor is placed under first digit of first station datum field.

NOTE

Station IDs listed in the Net Configure screen are determined from the data entered in CONFIGURE STATION (Figure 2-17) screen. Own-station ID is not displayed in the Net Configure screen (Figure 2-28). For example, if own station is configured as NET Control Station (NCS, S0), station IDs 1, 2, and 3 are listed in the Net Configure screen.

NOTE

When entering net station locations, the Left Arrow key may be used to return to previously entered fields.

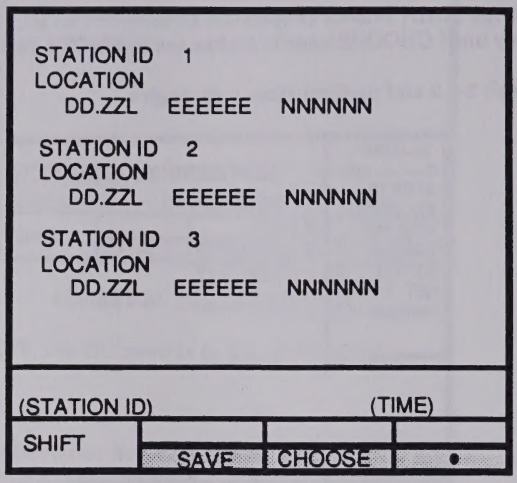


FIGURE 2-28. NET Configure Screen.

c. Establish voice communications with appropriate slave station.

d. Request slave station UTM coordinates.

e. Perform the following steps for first station in Net Configure List.

NOTE

Cursor returns to first digit of multiple-digit entries after the last digit is entered. Pressing **ENTER** stores the entered value in **RAM**.

(1) Enter datum value using numeric keys (see table 2-6).

(2) Using Right Arrow key, move cursor to grid sheet number field and enter grid sheet number using numeric keys.

(3) Using Right Arrow key, move cursor to grid sheet letter field and use **F3** key to select desired alpha character for grid sheet letter.

(4) Using Right Arrow key, move cursor to Easting field and enter Easting value using numeric keys.

(5) Using Right Arrow key, move cursor to Northing field and enter Northing value using numeric keys.

f. Using Right Arrow key, move cursor to first digit of datum field of next station location to be entered.

g. Repeat steps c thru f for remaining stations.

h. Press **F2** to save net configuration data to EEPROM.

i. Press **MENU** key to return to MAIN SCREEN (Figure 2-19).

i. Press **F1** key to enable alternate functions.

j. Press **F2** to select RCU panel.

k. Using Down Arrow, move cursor to NET field.

l. Press **F3** key to select DATA or VOICE mode as required.

2-7.2.3. Slave Station Initialization.

a. From MAIN SCREEN (Figure 2-19), select CONFIGURE by pressing **F1** key, press **F3** key until CHOOSE equals 1, then press ENTER key.

b. From CONFIGURE MAIN MENU (Figure 2-27), select NET CONFIGURE (Figure 2-28) by pressing **F1** key, press **F3** key until CHOOSE equals 2, then press ENTER key.

c. Establish voice communications with NCS.

d. Request NCS UTM coordinate data from NCS operator.

e. Enter UTM coordinate data for NCS (station 0) as follows:

(1) Enter datum values using numeric keys (see table 2-6).

(2) Using Right Arrow key, move cursor to grid sheet field and enter grid sheet number using numeric keys.

(3) Using Right Arrow key, move cursor to grid sheet alpha character, then press **F3** to select grid sheet alpha character.

(4) Using Right Arrow key, move cursor to easting field and enter six-digit easting value using numeric keys.

(5) Using Right Arrow key, move cursor to northing field and enter six-digit northing value using numeric keys.

f. Using Right Arrow key, move cursor to next station LOCATION field.

g. Establish communications with next station operator and repeat steps d through f for each remaining station.

h. Press **F2** key to save data to EEPROM. SAVED TO EEPROM is displayed in the status line.

i. Press MENU key to return to MAIN SCREEN (Figure 2-19).

j. Press **F1** key to enable alternate functions.

k. Press **F2** to select RCU panel.

l. Using Down Arrow, move cursor to NET field.

m. Press **F3** key to select DATA mode.

2-7.3. Receiver Control Unit Panel Operation.

The receiver control unit (RCU) panel is displayed in the upper left-hand corner of the DU screen and is available from the following screens:

- MAIN SCREEN
- CONFIGURE MAIN MENU
- LOB Screen
- MANFIX Screen
- DATAFIX Screen
- SCAN SEARCH Screen (Scan halted)
- STEP SEARCH Screen (Step halted)
- LOB History Screen
- Fix History Entry Screen

The RCU panel is used for manually tuning the receiver; setting the tuning step size for the TUNING wheel and TUNEUP and TUNEDN keys; selecting the receiver bandwidth; selecting the detection mode; selecting the receiver threshold; selecting the receiver squelch mode; selecting the network operating mode; and enabling/disabling the antenna preamplifier (PREAMP).

2-7.3.1. Access RCU Panel.

The RCU Panel is automatically accessed when the LOB, LOB History, and Fix History Entry screens are displayed. The cursor is positioned under the frequency display when these screens are displayed. To access the RCU panel from the MAIN SCREEN, CONFIGURE MAIN MENU, MANFIX, DATAFIX, SCAN SEARCH, and STEP SEARCH screens, press **F1**, then press **F2**. The cursor is positioned under the left-hand digit of the frequency display.

2-7.3.2. Tune Receiver.

The receiver may be tuned in three ways when the RCU panel is accessed: discrete frequency entry via the DU keypad; using the TUNEUP and TUNEDN (shifted **F3** and **F4**, respectively) keys; turning the front-panel TUNING wheel.

2-7.3.2.1. Discrete Frequency Entry.

a. Using Up/Down Arrow keys, position cursor in frequency field.

NOTE

For frequencies below 20 MHz, frequency may be entered to the nearest ten Hz (19.99999 Hz). Frequencies from 20 to 500 MHz may be entered to the nearest 100 Hz. Only those digits required to select the desired frequency need be entered. For example, enter 20 to tune the receiver to 20.0000 MHz.

b. Using numeric and decimal point (**F4**) keys, enter desired frequency.

c. Press **ENTER** to enter the selected frequency.

2-7.3.2.2. TUNEUP/TUNEDN Keys.

When the RCU is accessed, the shifted **F3** and **F4** keys are set to TUNEUP (tune up) and TUNEDN (tune down), respectively. Press **F1**, then press **F3** to increase the tuned frequency by the STEP value, or **F4** to decrease the tuned frequency by the STEP value.

2-7.3.2.3. TUNING Wheel.

The TUNING wheel, if unlocked during station configuration, may be used to tune the receiver. Turn the TUNING wheel clockwise to increase receiver tuned frequency. Turn the TUNING wheel counterclockwise to decrease receiver tuned frequency. The receiver will be tuned approximately 64 times the STEP value for each revolution of the TUNING wheel.

2-7.3.3. Set Tuning Step Size.

The STEP size determines the receiver tuning increment in kHz when using the TUNING wheel, or the TUNEUP and TUNEDN keys. The STEP size may be set to values from 0 to 150 kHz. Setting the STEP size to 0 selects the minimum tuning increment for the selected frequency; 10 Hz for frequencies from 0.5 to 19.99999 MHz and 100 Hz for frequencies from 20.0000 MHz to 500.0000 MHz.

The STEP size and bandwidth (BW) are interrelated. When a new STEP size is entered, it is compared with the selected BW and the BW is automatically adjusted to make the STEP size less than or equal to 1/2 the BW. Perform the following to set the STEP size.

a. Using Up/Down Arrow keys, position cursor in STEP field.

b. Using numeric keys, enter STEP value from 0 to 150 kHz.

c. Press Up/Down Arrow keys to move to new field, or press **ENTER** to enter new STEP size.

2-7.3.4. Select IF Bandwidth.

The AN/PRD-12 has intermediate frequency (IF) BW filters of 3, 10, 25, 50, 100, and 300 kHz. Perfom the following steps to select the BW using the RCU.

a. Using Up/Down ARROW keys, move cursor to BW field.

b. Press **F1**, then press **F3** to choose desired BW.

c. Press **ENTER** to save selection to RAM.

2-7.3.5. Select Modulation Mode.

The AN/PRD-12 is capable of demodulating the following modulation (MOD) types:

- Amplitude modulation (AM), including On/Off Keyed (OOK)
- Frequency Modulation (FM), including Frequency Shift Keyed Broadband FM Noise (Jamming)
- Continuous Wave (CW), including Intermittent Continuous Wave (ICW)
- Upper Side Band (USB)
- Lower Side Band (LSB)

The MOD selections available are AM, FM, CW, USB, and LSB. Perform the following steps to select the modulation mode (MOD).

NOTE

When intercepting CW, USB, or LSB, the TUNING wheel may be used to off-tune the receiver to maximize the effects of the fixed beat-frequency oscillator (BFO).

a. Using Up/Down Arrow keys, move cursor to MOD field.

b. Press **F1**, then press **F3** to choose desired modulation mode.

c. Press **ENTER** to save selection to RAM.

2-7.3.6. Select Signal Level Threshold.

The AN/PRD-12 contains a signal level monitor that is part of the squelch circuitry. Threshold values from 0 to 9 may be selected. The threshold value is referenced to the system noise floor. The AN/PRD-12 periodically measures the noise floor estimate (NFE) to ensure proper threshold comparisons. Perform the following steps to set the threshold .

a. Using Up/Down Arrow keys, move cursor to THRESH field.

b. Press **F1** to select SHIFTED F key functions, then press **F3** to choose desired threshold.

c. Press **ENTER** to save selection to RAM.

2-7.3.7. Select Squelch Operating Mode.

AN/PRD-12 squelch circuitry operates in one of four modes: OFF, ALL, ACC, and REJ. Table 2-7 shows the relationships between the four squelch modes. The four squelch modes are described in the following paragraphs.

- **OFF**. When squelch is set to OFF, all intercepted signals are demodulated and presented to the operator via the headset, regardless of the threshold setting. During automatic search operations, OFF operates the same as ALL. When the received signal exceeds the threshold, automatic search is stopped and the received audio is routed to the headset for monitoring.

Table 2-7. AN/PRD-12 Squelch Circuitry Operational Relationships

SQUELCH MODE	TONE	SIGNAL STRENTH	INTERCEPT	SEARCH
OFF	DON'T CARE	DON'T CARE	AUDIO	SAME AS ALL
ALL	DON'T CARE DON'T CARE	ABOVE THRESHOLD BELOW THRESHOLD	AUDIO ------	STOP CONTINUE
REJ	OFF ON OFF ON	ABOVE ABOVE BELOW BELOW	AUDIO ------ ------ ------	STOP CONTINUE CONTINUE CONTINUE
ACC	OFF ON OFF ON	ABOVE ABOVE BELOW BELOW	------ AUDIO ------ ------	CONTINUE STOP CONTINUE CONTINUE

- **ALL**. When squelch is set to ALL, all signals are compared with the operator-specified threshold. When the received signal exceeds the threshold, automatic search is stopped and the received audio is routed to the headset for monitoring.

- **REJ**. When squelch is set to REJ, all signals are checked for the presence of a 150-Hz tone. If the tone is present, the signal is squelched. When selected during automatic search operations, signals that have the 150-Hz tone or are below the selected threshold are squelched. Signals without the 150-Hz tone and above the threshold stop automatic search and are presented to the operator for monitoring.

- **ACC**. When squelch is set to ACC, all signals are checked for the presence of the 150-Hz tone. If the tone is not present, the signal is squelched. When selected during automatic search operations, signals without the 150-Hz tone or are below the selected threshold are squelched. Signals with the 150-Hz tone and above the threshold stop automatic search and are presented to the operator for monitoring.

NOTE

An icon (○ or ●) is displayed in the SQ field to indicate presence or absense of the 150-Hz squelch tone. When the tone is present, ● is displayed. ○ is displayed when the tone is absent.

a. Using Up/Down Arrow keys, move cursor to SQ field.

b. Press **F1**, then press **F3** to choose desired squelch mode.

c. Press **ENTER** to save selection to RAM.

2-7.3.8. Select Network (NET) Mode.

The AN/PRD-12 can operate in a network consisting of up to four stations. The network can operate in either data or voice mode. Perform the following steps to select the NET mode.

NOTE

The NET mode must be DATA when automatic fixes are to be calculated. When operating in the VOICE mode, manual fixes may be calculated.

a. Using Up/Down Arrow keys, move cursor to NET field.

b. Press **F1**, then press **F3** to choose desired NET mode.

c. Press **ENTER** to save selection to RAM.

2-7.3.9. Select Preamplifier ON/OFF.

The VHF/UHF and HF processors contain preamplifiers that increase the gain of their respective antennas. The PREAMP field is used to turn the preamplifiers ON or OFF as follows:

a. Using Up/Down Arrow keys, move cursor to PREAMP field.

b. Press **F1**, then press **F3** to choose PREAMP ON or PREAMP OFF.

c. Press **ENTER** to save selection to RAM.

2-7.4. Search Operations.

The AN/PRD-12 operated in three search modes: manual, scan, and step. In the manual search mode, the receiver is tuned manually using either the front-panel tuning wheel or the RCU panel. Scan search is used to determine radio activity in an operator-selected frequency band. Step search is used after active frequencies have been identified.

2-7.4.1. Manual Search Operation.

Manual search operations are performed using TUNEUP and TUNEDN **F** keys, or the TUNING wheel. The SHIFTED **F3** and **F4** keys are set to TUNEUP and TUNEDN, respectively, when the RCU is selected and the cursor is in the frequency field. The TUNING wheel may be used for manual search whenever it is UNLOCKed during station configuration. Turn the TUNING wheel to the clockwise to increase tuned frequency, and counter-clockwise to descrease tuned frequency.

a. Set STEP, BW, MOD, THRESH, and SQ as described in paragraph 2-7.3.

b. Using Up/Down Arrow keys, move cursor to RCU panel frequency field.

c. Press **F1**, then press **F3** to increase tuned frequency or **F4** to decrease tuned frequency.

2-7.4.2. Perform Scan Search.

A Scan Search examines the signal environment to determine what emitter frequencies are active in a selected frequency band. A Scan Search is comprised of four parts:

a. Plan - operator selects the frequency ranges, parameters and options to be covered in the frequency band(s) to be surveyed in the search.

b. Activate - plan is put into action; search of the plan band(s) is initiated.

c. Deactivate - search is stopped.

d. Display activity - each detected signal is displayed as a spectrum.

The entire frequency spectrum may be divided into three bands, defined by operator-specified start and stop frequencies. The bands may overlap each other, may be contiguous, or may be defined to have gaps between them (i.e., the bands may skip part(s) of the search-frequency spectrum).

The frequency increment determines the tuning frequencies for the receiver. Each successive tuning frequency is determined by adding the frequency increment (step size), in kHz, to the previous tuning frequency. Smaller step sizes result in more tuning commands per band and a slower search process; larger step sizes speed up the search process. The step size will never exceed one-half the selected bandwidth.

As the receiver is tuned to each successive frequency within a band, the received energy is examined to determine whether a signal is present. IF bandwidths of 3, 10, 25, 50, 100, or 300 kHz are available. The bandwidth specified should be appropriate for the type of signals expected.

A flag may be set for each band to indicate that LOBs should be automatically performed when emitter activity is detected.

2-7.4.2.1. Set Up Scan Band.

a. From MAIN SCREEN (Figure 2-19), select CONFIGURE by pressing **F1** key, press **F3** key until CHOOSE equals 1, then press **ENTER** key.

b. From CONFIGURE MAIN MENU (FIGURE 2-27), select SCAN LIST by pressing **F1** key, press F3 key until CHOOSE equals 3, then press **ENTER** key.

c. When SCAN BAND screen (Figure 2-29) appears, press **F1** key to enable alternate functions.

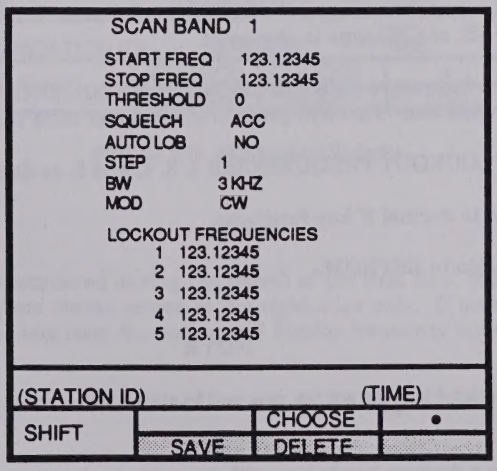


FIGURE 2-29. CONFIGURE SCAN LIST Screen.

d. Press **F3** key to select scan band 1, 2, or 3 and then press the **ENTER** key.

NOTE

Frequencies above 20 MHz may be entered to the nearest 100 Hz (0.0001 MHz). Frequencies below 20 MHz may be entered to the nearest 10 Hz (0.00001 Hz).

e. Using Down Arrow key, move cursor to **START FREQ** field and enter desired start frequency in MHz.

f. Using Down Arrow key, move cursor to **STOP FREQ** field and enter desired stop frequency in MHz.

g. Using Down Arrow key, move cursor to **THRESHOLD** field and press **F3** key to select desired threshold value between 0 and 9.

h. Using Down Arrow key, move cursor to **SQUELCH** field and press **F3** key until desired squelch mode (ACC, REJ, ALL, or OFF) is displayed.

i. Using Down Arrow key, move cursor to **AUTO LOB** field and, depending on whether or not you want to automatically generate a LOB upon detection of an active signal, press **F3** key to select YES or NO.

j. Using Down Arrow key, move cursor to **STEP** field and enter scan step size from 0 to 150 (kHz) using numeric keys.

k. Using Down Arrow key, move cursor to **BW** field and press **F3** key until desired bandwidth (3, 10, 25, 50, 100, or 300 kHZ) is displayed.

l. Using Down Arrow key, move cursor to **MOD** field and press **F3** key until desired modulation (AM, FM, LSB, USB, or CW) type is displayed.

m. Using Down Arrow key, move cursor to **LOCKOUT FREQUENCIES** field 1 and enter first frequency to be locked out. This will prevent the receiver from tuning to this frequency.

n. Repeat step m for **LOCKOUT FREQUENCIES** 2, 3, 4, and 5, as desired.

o. Press **F1** to return to normal **F** key functions.

p. Press **F2** to store data in EEPROM.

NOTE

If more than one scan band is to be set up, proceed to step q; otherwise press **MENU** key to return to MAIN SCREEN.

q. Repeat steps c thru p for scan bands two or three, as desired.

2-7.4.2.2. *Activate Scan Search.*

a. From MAIN SCREEN, select SCAN by pressing **F1** key, press **F3** key until CHOOSE equals 4, then press **ENTER** key.

b. Press **F3** key to start scanning.

NOTE

The SCAN SEARCH screen (Figure 2-30) will be displayed when scan mode is accessed. Receiver is automatically tuned to SCAN START frequency and the cursor is placed in the OPS panel. During the scanning process and until either a signal is encountered or the pause/halt mode is invoked, the scan search panel will be blank.

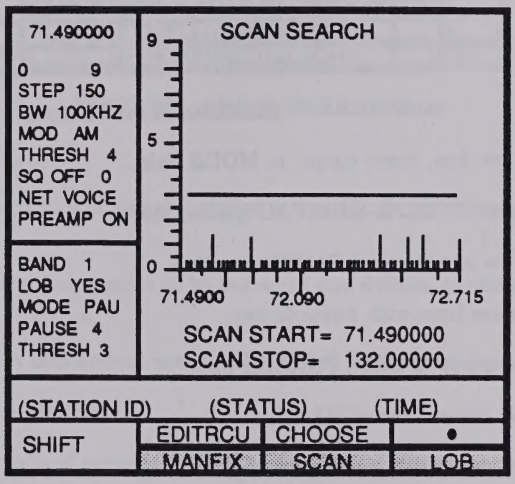


FIGURE 2-30. SCAN SEARCH Screen.

NOTE

If an active signal is encountered during the search of the first step, the screen will display frequency indications from center screen to the right edge only. If an active signal is encountered during the search of the last step, the screen will display frequency indications from the left edge to center screen only.

2-7.4.2.3. *Pause Scan Search.*

NOTE

When pause mode is selected, scan search will, upon signal detection, pause (Figure 2-31) for the time designated in seconds. This allows the operator the opportunity to listen to intercept audio, take a LOB, or FIX on that frequency.

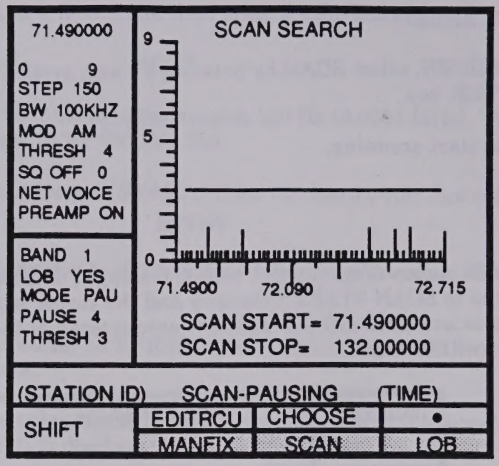


FIGURE 2-31. SCAN SEARCH PAUSE Screen.

a. Using Down Arrow key, move cursor to MODE field.

b. Press **F1** key, press **F3** key to select PAU (pause) mode.

c. Press Down Arrow key to select PAUSE duration.

d. Input desired pause time with numeric key.

e. Press Down Arrow key to select THRESH field.

f. Press **F3** to select desired threshold value.

g. Press ENTER key to retain the new settings.

2-7.4.2.4. Halt Scan Search.

When halt mode is selected, scan search will halt on the first frequency at which a signal is detected. This allows the operator the opportunity to listen to intercept audio, or take a LOB or FIX on that frequency. Figure 2-32 presents a typical Scan Halt screen. Perform the following steps to select the HALT mode.

a. Using Down Arrow key, move cursor to MODE field.

b. Press **F1** key, press **F3** key to select HALT mode.

c. Press ENTER key to save configuration. This configuration will affect all bands.

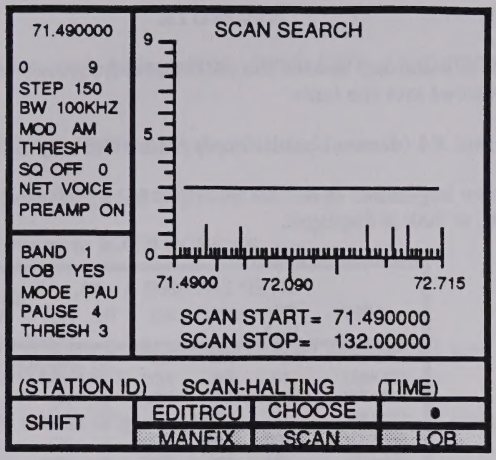


FIGURE 2-32. SCAN SEARCH HALT Screen.

2-7.4.3. Perform Step Search.

A step search surveys the activities of signal emitters at specific frequencies. A step search comprises four parts:

a. Plan - operator selects frequencies to be surveyed and defines parameters for each specified frequency.

b. Activate - plan is put into action; survey of specified frequencies is initiated.

c. Deactivate - search is stopped.

d. Display activity - results of survey are displayed as the OL-470 steps thru the steps listed.

The priority assigned to a frequency affects the survey rate (i.e., the number of times a frequency is surveyed). Priority may be specified at one of two levels:

- HI (maximum of 20 frequencies), surveys each specified frequency twice as often as frequencies with LO priority. Frequencies, in excess of 20, entered as HI priority default to LO priority types.

- LO, surveys each specified frequency as often as possible in the time remaining after checking the HI priority frequencies.

2-7.4.3.1. Set Up Step List.

a. From MAIN SCREEN (Figure 2-19), select CONFIGURE by pressing **F1** key, press **F3** key until CHOOSE equals 1, then press **ENTER** key.

b. From CONFIGURE MAIN MENU (Figure 2-27), select STEP LIST by pressing **F1** key, press **F3** key until CHOOSE equals 4, then press **ENTER** key.

c. When STEP ENTRIES screen (Figure 2-33) appears, press **F1** key to enable alternate functions.

NOTE

Pressing the **F2** (ADDRCU) key causes the RCU panel frequency and associated parameters to automatically be entered into the table

d. Using numeric and **F4** (decimal point) keys, enter first step frequency in FREQ field.

e. Using Right Arrow key, move cursor to BW KHZ field and press **F3** key until desired bandwidth (3, 10, 25, 50, 100, or 300) is displayed.

STEP ENTRIES 1 - 13

FREQ	BW KHZ	MOD	SQ	TH	AUT LOB	PRI
123.4567	3	AM	OFF	0	NO	LO
123.4567	10	FM	ACC	1	YES	HI
123.4567	25	CW	REJ	2	NO	LO
123.4567	50	USB	ALL	3	YES	HI
123.4567	100	LSB	OFF	4	NO	LO
123.4567	300	AM	ACC	5	YES	HI
123.4567	3	FM	REJ	6	NO	LO
123.4567	10	CW	ALL	7	YES	HI
123.4567	25	USB	OFF	8	NO	LO
123.4567	50	LSB	ACC	9	YES	HI
123.4567	100	AM	REJ	0	NO	LO
123.4567	300	FM	ALL	1	YES	HI
123.4567	3	CW	OFF	2	NO	LO

(STATION ID) (TIME)

SHIFT	ADD RCU	CHOOSE	•
	SAVE		NXTPAGE

FIGURE 2-33. STEP ENTRIES Screen.

f. Using Right Arrow key, move cursor to MOD field and press **F3** key until desired modulation type (AM, FM, LSB, USB, or CW) is displayed.

g. Using Right Arrow key, move cursor to SQ field and press **F3** key until desired squelch mode (ACC, REJ, ALL, or OFF) is displayed.

h. Using Right Arrow key, move cursor to TH field and press **F3** key to select desired threshold value between 0 and 9.

i. Using Right Arrow key, move cursor to AUT LOB field and press **F3** key to select either YES or NO.

j. Using Right Arrow key, move cursor to PRI field and press **F3** key for desired mode (HI or LO).

k. Press Right Arrow key to move to the next FREQ field.

l. Repeat steps c through k for each additional step frequency until page is filled.

NOTE

If more than 13 frequencies are to be loaded into STEP LIST, proceed to step m, otherwise proceed to step n.

m. Press **F1** key, press **F4** key, then repeat steps c thru k.

n. Press **F1** key followed by **F2** key to save step entries to memory.

o. Press MENU key to return to MAIN SCREEN.

2-7.4.3.2. Activate Step Search.

a. From MAIN SCREEN (Figure 2-19), select STEP by pressing **F1** key, press **F3** key until CHOOSE equals 3, then press **ENTER** key.

b. From STEP SEARCH screen (Figure 2-34), begin process, select STEP, by pressing **F3**.

NOTE

The STEP SEARCH screen (Figure 2-34) will be displayed as a blank panel, during the step process, until the process halts.

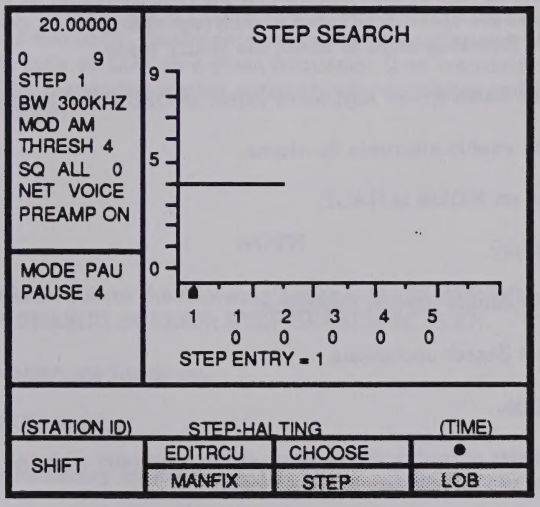


FIGURE 2-34. STEP SEARCH Screen.

2-7.4.3.3. Pause Step Search Activity.

NOTE

When pause mode is selected, step search will, upon signal intercept, pause for the time designated in seconds. This allows the operator to listen to intercept audio, take a LOB or take a FIX on that frequency.

a. Press **F1** key to enable alternate functions.

b. Press **F3** until OPS Panel MODE field indicates PAU.

c. Press Down Arrow key to select PAUSE duration.

d. Input desired pause time with numeric key and press **ENTER**.

e. Press **F1** to enable normal functions.

f. Press **F3** to start STEP process.

2-7.4.3.4. Halt Step Search Activity.

When halt mode is selected, step search will halt on the first frequency at which a signal is detected (Figure 2-35). This allows the operator to listen to intercept audio, take a LOB or take a FIX on that frequency. Perform the following steps to select the HALT mode.

a. Using the Up or Down Arrow key, move cursor to OPS Panel MODE field.

b. Press **F1** key to enable alternate functions.

c. Press **F3** key to set MODE to HALT.

d. Press **ENTER** key.

e. Press **F1** key to enable normal functions.

f. Press **F3** to start Search operations.

2-7.5. Intercept Operation.

Intercept operations consist of tuning the receiver either manually with the RCU, or automatically using a scan band or step list while monitoring received audio.

The OL-470/PRD-12 can also be used as an intercept receiver while on the move during redeployment.

2-7.6. Direction Finding (DF) Operation.

DF operations consist of calculating lines of bearing (LOBs), cuts, and fixes to target emitters. When operating as a stand-alone DF station, LOBs can be taken manually via a single key stroke or automatically whenever a signal is detected.

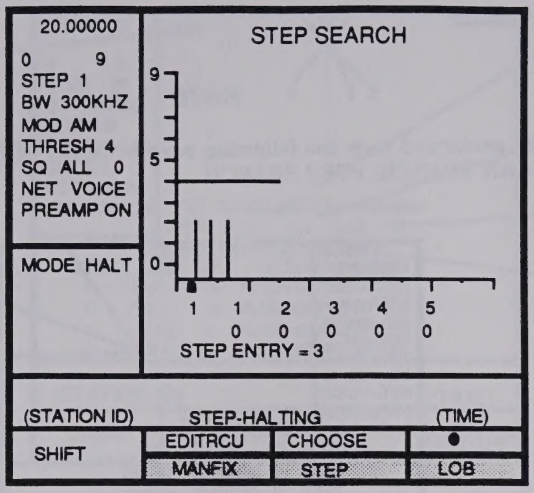


FIGURE 2-35. STEP SEARCH HALT Screen.

When operating as a member of a DF network, the AN/PRD-12 calculates cuts and fixes using LOB data received from other network members. Network operations can be accomplished in either manual (voice) or automatic (data) mode. In the voice mode, LOB and location data are transmitted to the requesting station by voice, then entered manually. In the data mode, the requesting operator presses a single key, to command remote stations to take an LOB on a given frequency, then transmit their LOBs and locations in a programmed sequence. The requesting station automatically calculates and displays the cut or fix and elliptical error probability (EEP).

2-7.6.1. Manual LOBs.

NOTE

This task may be performed from the following screens: MAIN SCREEN; CONFIGURE SCREEN; LOB SCREEN; SCAN SEARCH SCREEN; STEP SEARCH SCREEN.

a. Press **F1** to enable alternate functions.

b. Press **F2** to select RCU panel.

c. Edit RCU panel as necessary for desired LOB.

d. Press **F2** to stop editing RCU panel.

e. Press **F1** to enable normal functions.

f. Press **F4** to perform single station LOB.

g. Press **F1** to enable alternate functions.

g. Press **F2** to save LOB to EEPROM (Figure 2-36).

2-7.6.2. *Netted Fix and EEP*

NOTE

This task may be performed from the following screens: MAIN SCREEN; CONFIGURE MAIN MENU; LOB; SCAN SEARCH; STEP SEARCH.

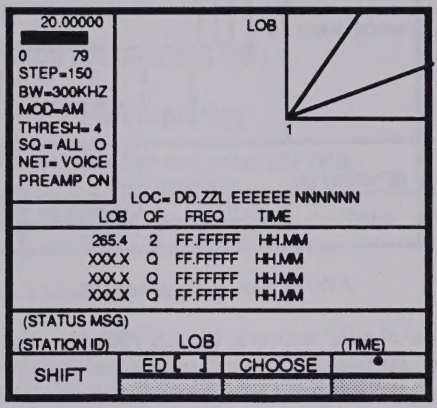


FIGURE 2-36. Manual LOB Screen.

NOTE

It is assumed that network operation has been initialized prior to performing this task.

a. Press **F1** to access alternate functions.

b. Press **F2** to access RCU panel.

c. Press Down Arrow until **NET** function is accessed.

d. Press **F3** to set NET mode to **DATA**.

NOTE

At this point, the **F2** functions change from EDITRCU and MANFIX to EDITOPS and DATAFIX, respectively.

e. Press **F1** to access alternate function.

f. Press **F2** to generate a Netted Fix. The display presents target coordinates and three sets of EEP numbers; major axis, minor axis and EEP (Figure 2-37).

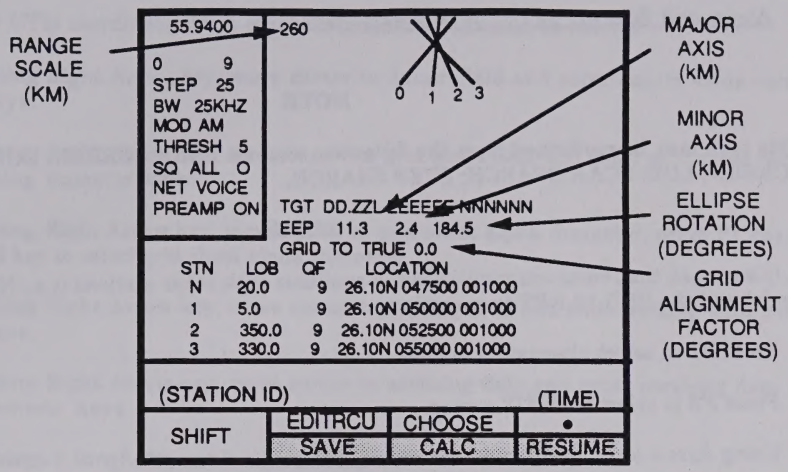


FIGURE 2-37. NETTED FIX and EEP Screen.

NOTE

The AN/PRD-12 displays six different icons (symbols) adjacent to the STN number in the fix screen. They are defined as follows:

BLANK (NO ICON) - indicates LOB has been accepted and is being used in the fix or cut calculation. Cursor is displayed adjacent to N when fix screen is first displayed.

\# NO RESPONSE - indicates that no response was received from the station identified.

\+ TRANSMIT FAILURE - indicates received response was garbled in transmission.

□ UNABLE TO CALCULATE LOB - indicates identified station was unable to calculate and LOB.

8 AUTO DESELECT - indicates AN/PRD-12 determined that LOB from station identified is invalid. This can be cause by no audio correlation, diverging LOBs, or parallel LOBs.

● OPERATOR DESELECT - indicates LOB for station identified has been deleted from the fix/cut calculation by the operator.

✳ HARDWARE FAILURE - indicates station identified had a hardware failure whenmeasuring the LOB during the fix/cut process. This can be caused by MHI over-tilt, all antenna array baselines failed, etc.

2-7.6.3. Access and Edit Fix and LOB Displays.

NOTE

This task may be performed from the following screens: MAIN SCREEN; CONFIGURE MAIN SCREEN; LOB; SCAN SEARCH; STEP SEARCH.

NOTE

It is assumed that voice communication is available with other stations (i.e., NET is in VOICE mode) and the PRD-12 NET is operating.

a. Press **F1** to select alternate functions.

b. Press **F2** to select MANFIX screen.

c. Using Arrow keys, position cursor in area to be edited (modified).

d. Changes to either LOB or LOCATION data are performed with numeric keys; changes to QF data are performed by pressing the **F3** key until the desired factor is achieved.

e. Press **F1** to select normal functions.

f. Press **F2** to save changes.

2-7.6.4. Manually Enter Remote LOBS.

a. Press **MENU** key to access MAIN MENU screen.

b. Press **F2** to select manual fix screen.

c. Establish voice communication with other station.

d. Using Down Arrow, move cursor to station being communicated with.

e. Using Right Arrow, move cursor to LOB field.

f. Request LOB azimuth data from other station.

g. Enter LOB data received from other station using numeric keys, then press **ENTER** key.

h. Using Right Arrow key, move cursor to QF field.

i. Request LOB quality factor (QF) from other station.

j. Press **F1** key, press **F3** key to select QF provided by other station.

k. Request UTM coordinates from other station and enter data as follows.

(1) Using Right Arrow key, move cursor to datum field and enter datum value using numeric keys.

(2) Using Right Arrow key, move cursor to grid sheet field and enter grid sheet numeric value using numeric keys.

(3) Using Right Arrow key, move cursor to grid sheet alpha character, press **F1** key, then press **F3** key to select grid sheet alpha character.

(4) Using Right Arrow key, move cursor to easting field and enter easting data using numeric keys.

(5) Using Right Arrow key, move cursor to northing field and enter northing data using numeric keys.

l. Repeat steps b thru j for remaining stations.

m. Press **F1** key to enable normal functions.

n. Press **F3** to perform a calculation.

o. Press **F2** to save data.

2-7.6.5. Manually Calculate Cut.

NOTE

This task assumes that the station requesting the FIX is in voice communications with another DF station in the network area. This task may be performed from the following screens: MAIN SCREEN; CONFIGURE SCREEN; LOB SCREEN; SCAN SEARCH SCREEN; STEP SEARCH SCREEN.

a. Press **F2** key and observe LOB data for local station and that MANUAL FIX screen is displayed.

b. Ensure voice communications are established with other station.

c. Request LOB azimuth data from other station.

d. Using Right Arrow key, move cursor to LOB field and enter LOB data received from other station using numeric and **F4** (decimal point) keys.

e. Request LOB quality factor (QF) from other station.

f. Using Right Arrow key, move cursor to QF field and enter LOB quality factor data from other station by pressing **F1** key, **F3** key until desired QF number (0 - 9) is displayed, then press the **ENTER** key.

NOTE

If network stations were entered from the Configure Net screen, skip step g.

g. Request UTM coordinates from other station.

h. Enter other station UTM coordinates as follows:

(1) Using Right Arrow key, move cursor to datum field and enter value using numeric keys.

(2) Using Right Arrow key, move cursor to grid sheet number field and enter grid sheet number using numeric keys.

(3) Using Right Arrow key, move cursor to grid sheet alpha field, then press **F3** key until desired alpha character is displayed.

(4) Using Right Arrow key, move cursor to easting field and enter easting value using numeric keys.

(5) Using Right Arrow key, move cursor to northing field and enter northing values using numeric keys.

(6) Press **ENTER** key.

i. Press **F1** key to enable normal functions.

j. Press **F3** key to perform calculation of manual cut.

2-7.6.6. Manually Calculate Fix and EEP.

NOTE

This task assumes that the station requesting the FIX is STATION 1 and that the other two stations are designated STATION 2 and STATION 3.This task may be performed from the following screens: MAIN SCREEN; CONFIGURE SCREEN; LOB SCREEN; SCAN SEARCH SCREEN; STEP SEARCH SCREEN.

a. Press **F2** key and observe LOB data for local station and that MANUAL FIX screen is displayed.

b. Ensure voice communications are established with other station.

c. Request LOB azimuth data from station 2.

d. Using Right Arrow key, move cursor to LOB field and enter LOB data received from other station using numeric and **F4** (decimal point) keys.

e. Request LOB quality factor (QF) from other station.

f. Using Right Arrow key, move cursor to QF field and enter LOB quality factor data from other station by pressing **F1** key, **F3** key until desired QF number (0 - 9) is displayed, then press the **ENTER** key.

NOTE

If network stations were entered from the Configure Net screen, skip step g.

g. Request UTM coordinates from other station.

h. Enter other station UTM coordinates as follows:

(1) Using Right Arrow key, move cursor to datum field and enter value using numeric keys.

(2) Using Right Arrow key, move cursor to grid sheet number field and enter grid sheet number using numeric keys.

(3) Using Right Arrow key, move cursor to grid sheet alpha field, then press **F3** key until desired alpha character is displayed.

(4) Using Right Arrow key, move cursor to easting field and enter easting value using numeric keys.

(5) Using Right Arrow key, move cursor to northing field and enter northing values using numeric keys.

(6) Press **ENTER** key.

i. Repeat steps c. through h(6) for station 3.

j. Press **F1** key to enable normal functions.

k. Press **F3** key to perform calculation of manual fix and EEP.

2-7.6.7. *Call Up LOB History Files.*

NOTE

If LOBs are taken without an associated FIX, the LOB history is accessed by pressing the **F4** key while in the MAIN SCREEN environment.

a. From MAIN SCREEN, select HISTORY by pressing **F1** key, **F3** key until CHOOSE equals 5, then press **ENTER** key.

b. From FIX HISTORY CATALOG screen (Figure 2-38), select LOBHIST by pressing **F3** key.

c. LOB HISTORY screen (Figure 2-39) appears.

c. Press **MENU** key or **F3** to either return to the main menu or the FIX HISTORY CATALOG screen.

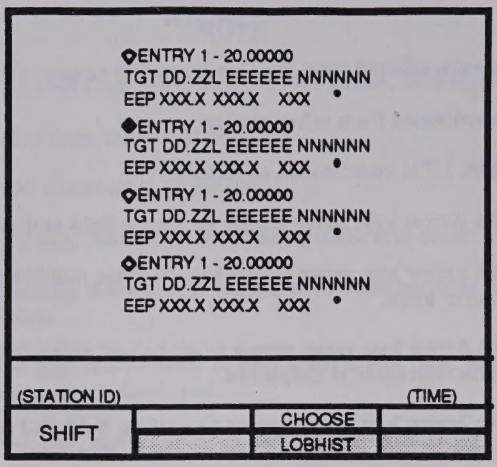


FIGURE 2-38. FIX HISTORY CATELOG Screen.

2-7.6.8. Manual Fix Screen.

a. Using Left/Right Arrows and Up/Down Arrows, move cursor to LOCATION field to be modified.

b. Enter first two numeric characters using keypad.

c. Press **F4** and then enter next two numeric characters.

d. Press **F3** to cycle through alpha characters A-Z for next character.

e. Enter the remainder of coordinates with numeric keypad.

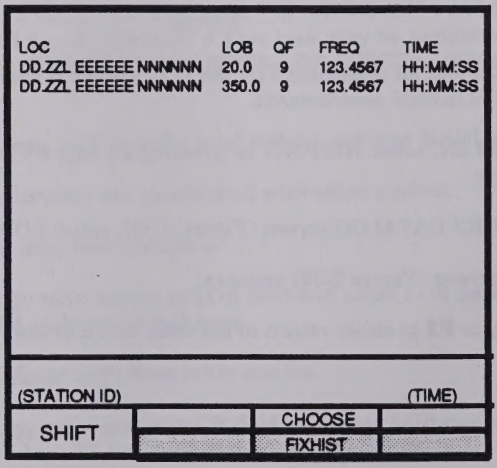


FIGURE 2-39. LOB HISTORY Screen.

2-7.7. Change Station Time.

a. From MAIN SCREEN (Figure 2-19), select CONFIGURE by pressing **F1** key, **F3** key until CHOOSE equals 1, then press **ENTER** key.

b. From CONFIGURE MAIN MENU (Figure 2-27), select STATION by pressing **F1** key, **F3** key until CHOOSE equals 1, then press **ENTER** key. CONFIGURE STATION Screen (Figure 2-17) appears.

c. Using Down Arrow key, move cursor to TIME hours field and enter hours using numeric keys.

d. Using Right Arrow key, move cursor to minutes field and enter minutes using numeric keys.

e. Press **F2** key to save change.

f. Press MENU key to return to MAIN screen.

2-7.8. Change Station Position.

NOTE

This task may be performed from the CONFIGURE - STATION and MANUAL FIX screens.

a. Refer to paragraph 2-7.2.1 and alter LOCATION data as necessary.

2-7.9. Set DU Backlighting.

a. Press and hold **MENU/BACKLIGHTING** key for a minimum of two seconds to enable backlighting control.

b. Press **0** key to turn backlighting off, or Up/Down Arrows to select desired level of backlighting.

2-7.10. Recharge Batteries.

WARNING

Do not attempt to recharge lithium-based batteries. Lithium-based batteries may explode during recharging,causing severe personal injury and/or equipment damage.

NOTE

Perform the following steps to operate the AN/PRD-12 while recharging nickel-cadmium (NiCad) batteries.

a. Set the ON/OFF switch to OFF position.

b. Release four spring clips securing battery case to center housing assembly and remove battery case.

c. Remove batteries.

d. Install battery charger in place of battery case and secure with four spring clips.

e. Connect recharge cable assembly to NiCad battery.

NOTE

The battery charger is capable of operating from 12, 24, and 48 V dc, as well as 115 and 240 V ac, single-phase, 50 to 60 Hz power. However, batteries can only be charged if the battery charger is operating from an AC power source.

f. Connect battery charger to power source.

g. Set battery charger ON/OFF switch to **ON**. **STATUS** indicator lights when NiCad battery is fully charged.

NOTE

If AN/PRD-12 is required to operate during battery recharging, set receiver/processor ON/OFF switch to ON.

2-8. OPERATION OF AUXILIARY EQUIPMENT.

In the text of this manual, all referenced equipment is used with, but not part of, the direction finder (df) set and associated equipment.

Associated equipment includes all transmitting and receiving equipment - other than the receiver in the direction finder (df).

Operation of the associated equipment is not covered in this manual. To operate, refer to specific instruction manuals issued with such equipment. Manuals that cover use of associated equipment are listed in appendix A of this manual.

2-9. PREPARATION FOR MOVEMENT.

This section provides step-by-step instructions for preparing the AN/PRD-12 for movement to a new location. Procedures are provided for disassembly and stowage of the antenna groups and receiver/processor. The procedures should be performed in the order given, although some tasks may be performed at the same time by the two operators.

2-9.1. Disassemble Station-HF Operation.

CAUTION

To prevent possible damage to the equipment, ensure that front panel assembly power switch is set to OFF before disconnecting cables or removing assemblies.

a. Person A: Set power switch to **OFF** and disconnect all cables from receiver/processor front panel.
Person B: Disconnect HF antenna cables from HF antenna bases.

b. Person A: Remove intercept antenna and place in transport pack.
Person B: Disconnect HF antenna cables from HF processor and replace all dust covers.

c. Person A: Place receiver/processor, headset, and DU in transport pack.
Person B: Disconnect HF BIT antenna and place in HF antenna bag.

d. Person A: Coil HF/control cable W2 into an approximately five-inch coil.
Person B: Disconnect HF control cable W2 from HF processor.

e. Person A: Place HF processor and HF/control cable W2 in HF antenna bag.

f. Person A: Push HF whip antennas into bases.
Person B: Pull HF antenna bases out of ground stakes.

g. Person B: Place HF antenna bases in HF antenna bag.

h. Person A: Coil HF antenna cables into 5-inch coils.
Person B: Assist person A.

i. Person A: Place HF antenna cables in HF antenna bag.
Person B: Assist person A.

NOTE

It may be necessary to kick ground stakes to loosen them from the ground.

j. Person A: Pull ground stakes out of ground.
Person B: Assist person A.

k. Person A: Place ground stakes in HF antenna bag.

l. Person A: Fold HF antenna bag and tighten straps.

m. Person A: Place HF antenna bag in transport pack.

NOTE

If intercept on-the-move operations are required, perform Assemble Station On-The-Move Intercept as described in 2-9.5

2-9.2. Disassemble Station-VHF/UHF Operation.

CAUTION

To prevent possible damage to the equipment, ensure that front panel assembly power switch is set to OFF before disconnecting cables or removing assemblies.

NOTE

If this equipment is to be used in the intercept on the move configuration, leave the headset, intercept antenna, and the DU connected in the following steps.

a. Person A: Set power switch to OFF and disconnect all cables from receiver/processor and replace all dust covers.

b. Person A: Unscrew intercept antenna from receiver/processor and place in transport pack.

c. Person A: Place OL-470 into transport pack.

WARNING

Lowering and raising the mast requires two people. The mast must be supported when loosening guys. Serious personal injury and/or equipment damage may result if mast is allowed to fall when extended to its full height.

d. Person A: Hold mast steady.
Person B: Remove guys from stake that is in direct line with base stake and base plate. and hold in hands.

e. Person A: Walk mast down from verticle stopping when mast is at a height to be supported on your shoulder.
Person B: Assist person A by maintaining stress on guy lines.

f. Person A: Support mast on shoulder.
Person B: Release guy lines and move to mast head.

WARNING

Ensure that positive control of mast is maintained while removing feed arms. Failure to do so could cause equipment damage or personal injury.

g. Person B: Remove antenna support arms from RF processor, replace dust cover, and gently place on ground away from mast head.
Person A: Maintain positive control of mast, ensuring that it does not spin when support arms are disconnected.

h. Person B: Remove BIT antenna from RF processor J6 and stow in VHF/UHF antenna bag.

i. Person A: Remove RF processor from mast head by loosening three 1/4 turn fasteners and lower mast to ground.

CAUTION

When folding or unfolding VHF and UHF dipole elements, grasp the element within 6 inches of the swivel base. The elements may be broken if the pressure required to fold or unfold them is applied near the element ends.

Person B: Fold VHF and UHF dipole elements down against support arms.

j. Person A: Remove RF control cable from RF processor jack J1, replace dust cover, and place cable on ground.
Person B: Remove UHF support arms from VHF feed arms and replace dust covers.

k. Person A: Place RF processor into VHF/UHF antenna bag.
Person B: Place UHF and VHF antenna support arms into VHF/UHF antenna bag.

l. Person A: Coil RF control cable and place into VHF/UHF antenna bag.

m. Person A: Remove guy lines from mast.
Person B: Remove guy lines from stakes

n. Person A: Wind guys on guy stays.
Person B: Assist person A.

o. Person A: Stow guy lines in VHF/UHF antenna bag.
Person B: Pull guy stakes out of ground.

NOTE

It may be necessary to kick guy stakes to loosen them from the ground.

p. Person A: Remove mast base plate from mast by turning 1/4 turn fastener and stow base plate in VHF/UHF antenna bag.

q. Person A: Collapse mast into itself, starting from the mast head, by lifting each section approximately 1/8 inch, turn mast section counter-clockwise while pushing down. Stow mast in VHF/UHF antenna bag.
Person B: Stow guy stakes in VHF/UHF antenna bag.

r. Person A: Close VHF/UHF antenna bag and secure by tightening straps.

s. Person A: Place VHF/UHF antenna bag in transport pack.

2-9.3. Disassemble Station-HF and VHF/UHF Operation.

CAUTION

To prevent possible damage to the equipment, ensure that front panel assembly power switch is set to OFF before disconnecting cables or removing assemblies.

NOTE

If this equipment is to be used in the intercept on the move configuration, leave the headset, intercept antenna, and the DU connected in the following steps.

a. Person A: Set power switch to OFF and disconnect all cables from receiver/processor.
Person B: Collapse HF antennas and disconnect HF antenna cables from HF ant bases.

b. Person A: Unscrew intercept antenna from receiver/processor and place in transport pack.
Person B: Disconnect HF antenna cables from HF processor and coil cables into approximately five inch coils.

c. Person A: Disconnect control cables from HF processor and coil HF/control cable into an approximately 5-inch coil.

d. Person A: Place OL-470 into transport pack.
Person B: Disconnect HF BIT antenna from HF processor J8 and place processor and BIT antenna in HF antenna bag.

e. Person A: Place coiled cables into HF antenna bag.

f. Person A: Pull HF antenna bases out of ground stakes.

g. Person A: Place HF antenna bases in HF antenna bag.

NOTE

It may be necessary to kick ground stakes to loosen them from the ground.

h. Person B: Pull ground stakes out of ground.
Person A: Assist person B.

i. Person A: Place ground stakes in HF antenna bag.

j. Person A: Fold HF antenna bag and tighten straps.

k. Person A: Place HF antenna bag in transport pack.

WARNING

Lowering and raising the mast requires two people. The mast must be supported when loosening guys. Serious personal injury and/or equipment damage may result if mast is allowed to fall when extended to its full height.

l. Person A: Hold mast steady.
Person B: Remove guys from stake that is in direct line with base stake and base plate and hold in hands.

m. Person A: Walk mast down from verticle stopping when mast is at a height to be supported on your shoulder.
Person B: Assist person A by maintaining stress on guy lines.

n. Person A: Support mast on shoulder.
Person B: Release guy lines and move to mast head.

WARNING

Ensure that positive control of mast is maintained while removing feed arms. Failure to do so could cause equipment damage or personal injury.

o. Person B: Remove antenna support arms from RF processor, replace dust cover, and gently place on ground away from mast head.
Person A: Maintain positive control of mast, ensuring that it does not spin when support arms are disconnected.

p. Person B: Remove BIT antenna from RF processor J6 and stow in VHF/UHF antenna bag.

q. Person A: Remove RF processor from mast head by loosening three 1/4 turn fasteners and lower mast to ground.

CAUTION

When folding or unfolding VHF and UHF dipole elements, grasp the element within 6 inches of the swivel base. The elements may be broken if the pressure required to fold or unfold them is applied near the element ends.

Person B: Fold VHF and UHF dipole elements down against support arms.

r. Person A: Remove RF control cable from RF processor jack J1, replace dust cover, and place cable on ground.
Person B: Remove UHF support arms from VHF feed arms and replace dust covers.

s. Person A: Place RF processor into VHF/UHF antenna bag.
Person B: Place UHF and VHF antenna support arms into VHF/UHF antenna bag.

t. Person A: Coil RF control cable and place into VHF/UHF antenna bag.

u. Person A: Remove guy lines from mast.
Person B: Remove guy lines from stakes

v. Person A: Wind guys on guy stays.
Person B: Assist person A.

w. Person A: Stow guy lines in VHF/UHF antenna bag.

NOTE

It may be necessary to kick guy stakes to loosen them from the ground.

Person B: Pull guy stakes out of ground.

x. Person A: Collapse mast into itself, starting from the mast head, by lifting each section approximately 1/8 inch, turn mast section counter-clockwise while pushing down.
Person B: Stow guy stakes in VHF/UHF antenna bag.

y. Person A: Remove mast base plate from mast by turning 1/4 turn fastener and stow mast and base plate in VHF/UHF antenna bag.

z. Person A: Close VHF/UHF antenna bag and secure by tightening straps.

aa. Person A: Place VHF/UHF antenna bag in transport pack.

2-9.4. Disassemble Station-Vehicle Operation.

CAUTION

To prevent possible damage to the equipment, ensure that front panel assembly A1A10 power switch is set to OFF before disconnecting cables or removing assemblies.

a. Set power switch to **OFF**.

NOTE

If antenna subsystems are installed, refer to the appropriate disassembly procedure in this TM.

b. Loosen top clamp spring clips securing DU in MT-6700.

c. Disconnect DU cable from receiver/processor front panel and remove DU.

d. Disconnect all cables from receiver/processor front panel.

e. Disconnect battery charger cable from vehicle

f. Release four (4) spring clip securing receiver/processor in MT-6700 and remove receiver/processor.

g. Replace top clamp and secure four (4) spring clips.

NOTE

If MT-6700 needs to be removed, notify Organizational Maintenance to remove the MT-6700 from vehicle.

2-9.5. Assemble Station-On-The-Move Intercept.

NOTE

Perform this task after the station has been disassembled and placed in transport packs (ALICE, WIEC, Dragon missile).

a. Connect DU to receiver/processor front panel **CDU** jack.

b. Connect headset to receiver/processor front panel **AUDIO** jack.

NOTE

Receiver/processor front panel INTCP ANT lug provides intercept antenna mounting holes that are arranged so that intercept antenna can be kept vertical during most receiver/ processor orientations. Install intercept antenna in the front panel INTCP ANT lug hole that will keep it as close to vertical as possible during intercept on-the-move operations.

c. Thread intercept antenna into receiver/processor front panel **INTCP ANT** lug and hand tighten.

d. Set receiver/processor front panel power switch to **ON**. CONFIGURE-STATION screen (Figure 2-16) appears on DU in approximately 10 seconds.

e. Verify the following station configuration:

(1) STATION MODE: ATTENDED

(2) TERMINAL: CDU

(3) ANTENNA: WHIP

(4) TUNING WHEEL: LOCK

f. If station configuration is incorrect, press Down Arrow key to position cursor on line requiring correction, then press **F3** key until correct option is displayed.

g. Press **F2** key to save station configuration and return to MAIN SCREEN.

h. Perform task MANUALLY TUNE RECEIVER, paragraph 2-6.4 as required to intercept desired signals.

2-10. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION SHEETS.

The AN/PRD-12 has one operating instruction on a decal. This is the HF antenna layout placard located on the HF processor.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

	Para	Page
Operation in Unusual Weather	2-11	2-80
Fording and Swimming	2-12	2-80
Emergency Procedures	2-13	2-81

2-11. OPERATION IN UNUSUAL WEATHER.

Operation in unusual weather consist of conditions related to operating in extreme heat, extreme cold, areas of high moisture, exposure to salt air, exposure to sea spray, exposure to dust and sand storms, operation at high altitudes, and exposure to snow and mud.

The AN/PRD-12 is designed and engineered specifically for operation in the above unusual weather conditions. There are, however, two specific areas that the operator should be concerned with; high wind conditions and electrical storms.

2-11.1 Operation in High Wind.

The AN/PRD-12 mast is designed and warranted to be erectable by two people and to remain operable in sustained winds up to 20 knots, and it will withstand wind gusts up to 50 knots after it is erected. When operating in these conditions, the mast guy lines should be checked and tightened as needed at 15-minute intervals.

WARNING

Stay upwind of the antenna array when operating in high winds. Serious personal injury and equipment damage may result if the antenna array is blown down.

NOTE

All vehicles should be located outside the mast fall zone.

2-11.2 Operation in Electrical Storms.

The AN/PRD-12 is designed and warranted to operate in conditions of rain and intermittent wind and may be grounded to protect against electrical shock. However, due to the power and unpredictable nature of lightning, the potential exists for physical damage to equipment and injury or death to personnel should the mast be struck by lightning during operation.

2-12. FORDING AND SWIMMING.

The AN/PRD/12 is designed and warranted to be immersion proof, to a covering depth of three feet for a minimum of two hours. However, normal precaution should be taken during periods of fording and swimming to keep the equipment as dry as possible by either enclosing in a waterproof container or keeping it above water as much as possible.

2-13. EMERGENCY PROCEDURES.

Operation under conditions requiring emergency procedures consists of the temporary adaptation of the equipment and its operating procedures to meet emergency situations. These emergency situations consist of reductions of power, partial failures, failure of a portion of the AN/PRD-12 equipment, or similar conditions when continued use of the equipment is required.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

	Para	Page
Lubrication Instructions.....	3-1	3-1

3-1. LUBRICATION INSTRUCTIONS.

There are no lubrication procedures to be performed by the AN/PRD-12 operator.

Section II. Troubleshooting Procedures

	Para	Page
Troubleshooting Procedures.....	3-2	3-1

3-2. TROUBLESHOOTING PROCEDURES.

Caution indicators alert the operators if a failure or hazardous condition develops during operation. System malfunction messages that appear on the DU also notify the operator of equipment failures. Troubleshooting for most problems involves BIT testing.

When a problem exists with the AN/PRD-12, the operator should isolate that problem to the faulty device. The following troubleshooting table lists the common malfunctions that you may find during operation or maintenance of the AN/PRD-12 or its components. You should perform the tests/inspections and corrective actions in the listed order.

This manual cannot list all malfunctions that may occur, nor all possible tests or inspections and corrective actions. If a malfunction is not corrected by the listed actions, notify your supervisor or refer to higher maintenance level.

To locate the correct procedure for troubleshooting a particular problem, use the following symptom index.

SYMPTOM INDEX

Malfunction	Malfunction Number
No power indication on DU	1
Voice/Data Link	2
No audio in headset	3
Batteries won't recharge	4

1. NO POWER INDICATION ON DU.

- STEP 1. Unscrew fuse cover(Appendix D, item 1) on front panel of receiver/processor.
- STEP 2. Inspect fuse, via glass window, to insure fuse link is intact
- STEP 3. If fuse is blown, replace with spare on front panel.
- STEP 4. If fuse is not blown, replace battery.
- STEP 5. If this does not correct problem, notify Organizational Maintenance of failure.

2. VOICE/DATA LINK.

- STEP 1. Rekey the KY-57.
- STEP 2. Verify that the radio is properly set-up.

3. NO AUDIO IN HEADSET.

- STEP 1. Connect headset to the radio, if audio is now present, then receiver/processor is faulty.
- STEP 2. If no audio is present, headset is faulty.

4. BATTERIES WON'T RECHARGE.

- STEP 1. Unscrew F1 fuse cover on battery charger.
- STEP 2. Inspect fuse, via glass window, to insure fuse link is intact
- STEP 3. If fuse is blown, replace with spare (Appendix D, item 2).
- STEP 4. If fuse is not blown, replace cover.
- STEP 5. Unscrew F3 fuse cover on battery charger.
- STEP 6. Inspect fuse, via glass window, to insure fuse link is intact
- STEP 7. If fuse is blown, replace with spare (Appendix D, item 2).
- STEP 8. If fuse is not blown, replace cover and notify Organizational Maintenance of faulty battery charger.

Section III. Maintenance Procedures

	Para	Page
Introduction	3-3	3-3
Inspection	3-4	3-3
Maintenance Checks and and Adjustments	3-5	3-3
Removal and Installation	3-6	3-3
Cleaning	3-7	3-3
Test After Repair	3-8	3-4

3-3. INTRODUCTION.

T his section contains maintenance information for the AN/PRD-12 operator. Operator maintenance is limited to equipment inspection, testing with BITE, servicing, and the removal and installation of major components. Any trouble beyond the scope of the operator shall be referred to a higher maintenance level.

3-4. INSPECTION.

AN/PRD-12 operators are authorized to perform the equipment inspections described in Preventive Maintenance Checks and Services (PMCS), chapter 2, section II.

3-5. MAINTENANCE CHECKS AND ADJUSTMENTS.

AN/PRD-12 operators are authorized to perform the BIT tests in chapter 2, section III, and troubleshooting procedures in chapter 3, section II.

3-6. REMOVAL AND INSTALLATION.

Operator removal and installation is limited to the swapping of box level LRUs, fuses and batteries. Refer to 3-2 for fuse replacement procedure. Refer to 2-6.1 for battery replacement procedure. Refer to 2-7.10 for battery recharge procedure.

3-7. CLEANING.

The AN/PRD-12 operator is responsible for maintaining proper cleanliness of the equipment. Cleaning procedures are common to all AN/PRD-12 equipment. Perform all cleaning actions in accordance with the following steps:

a) Using varnish brush (Appendix D, item 3), remove dust from all external surfaces.

b) Using a clean, lint-free cloth (Appendix D, item 4) that has been dampened (not wet) with isopropyl alcohol (item 5), remove grease and dirt.

c) If required, use a clean varnish brush (Appendix D, item 3) and isopropyl alcohol (Appendix D, item 5) to remove any residual grease and dirt, or other contaminant, from exposed surfaces.

3-8. TEST AFTER REPAIR.

Always verify AN/PRD-12 operation after equipment repairs.

a. If the fault was discovered during the performance of the BIT, repeat BIT to verify proper performance.

b. If the fault was discovered during operation, repeat the operation to verify proper performance.

CHAPTER 4

MAINTENANCE OF AUXILIARY EQUIPMENT

4-1. MAINTENANCE OF AUXILIARY EQUIPMENT.

Refer to appropriate technical manual, referenced in Appendix A, to see if there is any operator maintenance authorized for the auxiliary equipment used with the AN/PRD-12.

APPENDIX A
REFERENCES

A-1. SCOPE

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS

DA Form 2024	Equipment Inspection and Maintenance Work Sheet
DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2062	Hand Receipt/Annex No.
SF 368	Quality Deficiency Report

A-3. FIELD MANUALS

N/A

A-4. TECHNICAL MANUALS

TM 11-5810-256-12	Operator's and Organizational Maintenance Manual for Communications Security Equipment TSEC/KY-57
TM 11-5820-667-10	Operator Manual Radio Set AN/PRC-77
TM11-5829-667-12	Operator and Organizational Maintenance Manual Radio Set AN/PRC-70
TM 11-5820-401-12	Operators Manual for the AN/VRC-12 Series Radio Sets
TM 32-5825-001-10-HR	Hand Receipt Covering Contents of Components of End Item (COEI), Basic Issue Items (BII), and Additional Authorization List (AAL) for Direction Finder Set, AN/PRD-12
TM 38-750	The Army Maintenance Management System (TAMMS)

A-5. MISCELLANEOUS PUBLICATIONS

AR 310-2	Identification and Distribution of DA Publications and Issue of Agency and Command Administrative Publications
TB 32-5825-002-20/1	Warranty Program for Direction Finder Set AN/PRD-12
SB 38-100	Preservation, Packaging and Marketing Materials, Supplies and Equipment Used by the Army

APPENDIX B

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

SECTION 1. INTRODUCTION

B-1 SCOPE.

This appendix lists components of end item and basic issue items for Direction Finder Set AN/PRD-12. It will help you inventory items required for safe and efficient operation.

B-2 GENERAL.

The Components of End Item and Basic Issues Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for operator information only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. These items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist in identifying the items.

b. Section III. Basic Issue Items. There are no Basic Issue Items for the AN/PRD-12.

B-3 EXPLANATION OF COLUMNS.

The following paragraphs explain the columns in the tables:

a. Column (1) - Illus no. (illustration number). This column gives the number of the illustration in which the item is shown.

b. Column (2) - National stock no. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3) - Description, CAGE, and part no. Indicates the Federal item name and describes the item. The last line for each item indicates the Commercial and Government Entity (CAGE) in parentheses, followed by the part number.

d. Column (5) - Qty rqr (Quantity required). Indicate the quantity of the item authorized to be used with/on the equipment.

SECTION II. COMPONENTS OF END ITEM

(1) Illus. No.	(2) National Stock Number	(3) Description, CAGE, and Part No.	(4) U/M	(5) Qty. Req.
1	5985-01-304-2940	Antenna Assembly, HF (AS-4144/PRD-12), 57958, C5156660-1, consisting of:	EA	1
		Antenna Assembly, HF, 579058, C5156680-1	EA	3
	5985-01-311-2529	Antenna, HF BIT, 57958, C5156675-1	EA	1
	8105-01-317-8182	Bag, Antenna, HF, 57958, C5156664-1	EA	1
	5995-01-311-2536	Cable Assembly, 57958, C5156694-1	EA	3
	5811-01-311-6416	Processor, HF, 57958, C5156665-1	EA	1
		Layout Line, 57958, C5158765-1	EA	1
2	5985-01-304-2941	Antenna AS-4143/PRD-12 (VHF/UHF), 57958, C5156620-1, consisting of:	EA	1
	5985-01-311-2560	Antenna Support Arm Assembly, VHF, 57958, C5156640-1	EA	4
	5985-01-304-2940	Antenna Support Arm Assembly, UHF, 57958, C5156643-1	EA	4
	5985-01-311-2527	Antenna, VHF/UHF BIT, 57958, C5156675-2	EA	1
	8105-01-317-8181	Bag, Antenna, VHF/UHF, 57958, C5156663-1	EA	1
	5811-01-311-6415	Processor, VHF/UHF, 57958, C5156625-1	EA	1
		Mast Assembly, Light Weight, 57958, C5156622	EA	1
3	5895-01-304-8029	Receiver Group (OL-470/PRD-12), 57958, C5156505-1, consisting of:	EA	1

(1) Illus. No.	(2) National Stock Number	(3) Description, CAGE, and Part No.	(4) U/M	(5) Qty. Req.
3 cont.	5895-01-311-2630	Front Panel Assembly, 57958, C5156610-1	EA	1
	5895-01-318-0335	Center Housing Assembly, 57958, C5156615-1	EA	1
		Battery Case Assembly, 57958, C5156616-1	EA	1
	7025-01-304-2986	Display Unit (ID-2465/PRD-12), 57958, C5156600-1	EA	1
	5985-01-311-2526	Antenna, Intercept, 57958, C5156718-1	EA	1
	5965-01-304-2939	Headset, Electric (H-362/PRD-12), 57958, C5158362-1	EA	1
4	6130-01-304-3025	Battery Charger (G-83/PRD-12), 57958, C5156690-1, consisting of:	EA	1
		Ac Power Cable Assembly, 57958, C5158595-1	EA	1
		Dc Power Cable Assembly, 57958, C5158596-1	EA	1
		Charge Cable Assembly, 57958, C5158597-2	EA	1
5	5975-01-304-7991	Electrical Equipment Mounting Base (MT-6700/PRD-12), 57958, C5156677-1	EA	1
6	5995-01-311-2537	Cable Assembly, RF/CNTRL, 57958, C5156693-1	EA	1
7	5995-01-311-2538	Cable Assembly, HF/CNTRL, 57958, C5156693-2	EA	1

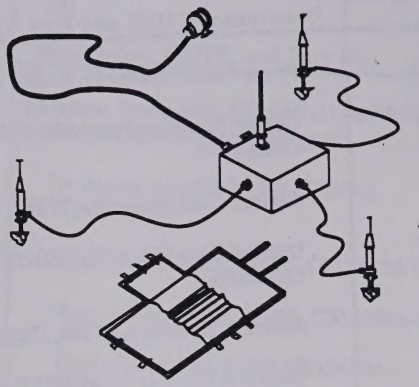


Figure B-1. Antenna Assembly (HF) AS-4144/PRD

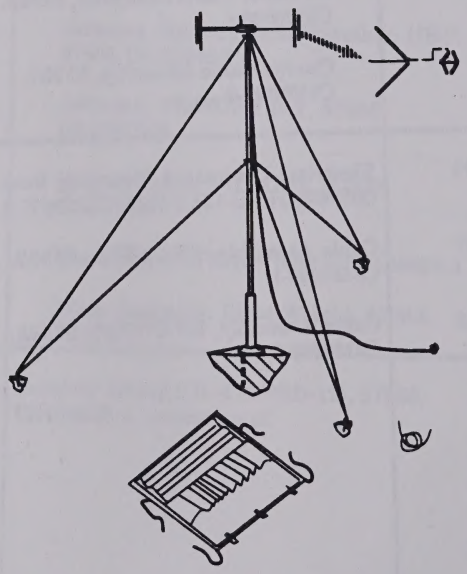


Figure B-2. Antenna Assembly (VHF/UHF) AS-4143/PRD

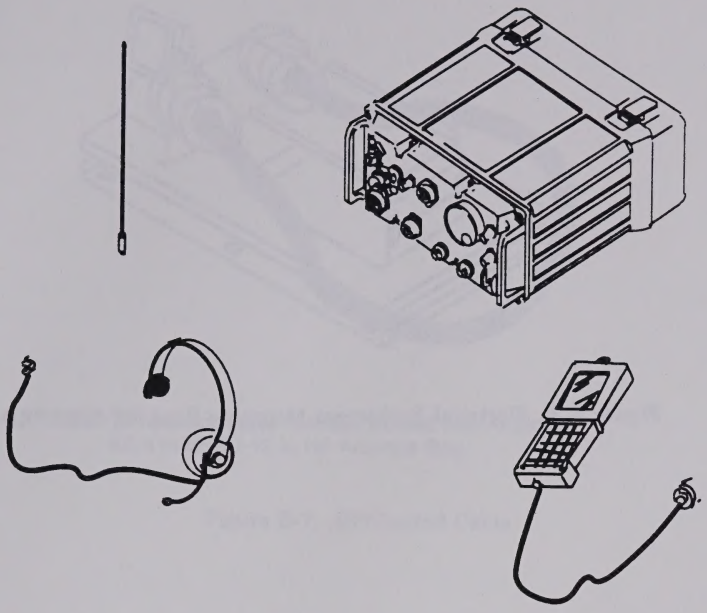


Figure B-3. Receiver Group OL-470/PRD-12

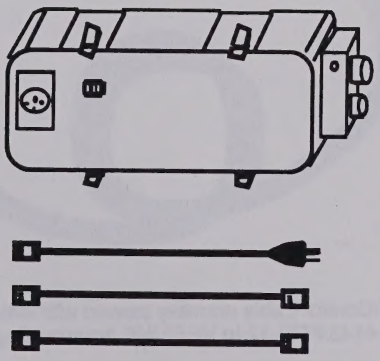


Figure B-4. Battery Charger G-83/PRD-12

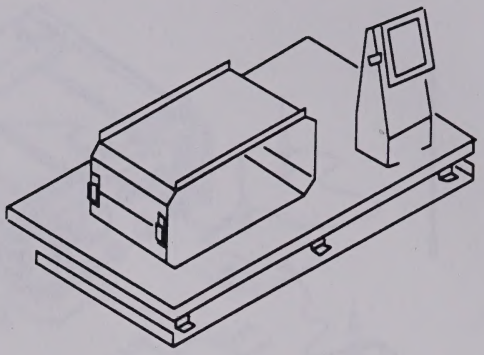
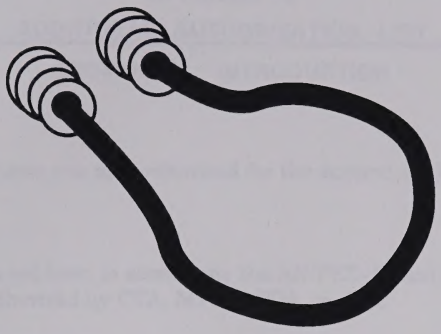


Figure B-5. Electrical Equipment Mounting Base MT-6700/PRD-12

Note: RF/Control Cable normally stowed with Antenna AS-4143/PRD-12 in VHF/UHF Antenna Bag.

Figure B-6. RF/Control Cable



Note: HF/Control Cable normally stowed with Antenna AS-4144/PRD-12 in HF Antenna Bag.

Figure B-7. HF/Control Cable

APPENDIX C

ADDITIONAL AUTHORIZATION LIST

SECTION 1. INTRODUCTION

C-1. SCOPE.

This appendix lists additional items you are authorized for the support of the AN/PRD-12.

C-2. GENERAL.

This list identifies items that do not have to accompany the AN/PRD-12 and that do not have to be turned in with it. These items are all authorized by CTA, MTOE, TDA, or JTA.

C-3. EXPLANATION OF LISTINGS.

National stock numbers, descriptions, and quantities are provided to help identify and request additional items required to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) that authorizes the item(s).

Section II. ADDITIONAL AUTHORIZATION LIST

(1) National Stock Number	(2) Description, CAGE, and Part No.	(3) U/M	(4) Qty. Req.
5810-00-434-3644	Communications Security Equipment (KY-57)	EA	1
5595-01-052-0967	Interface Cable for Communications Security Equipment (KY-57), CX-10373/U	EA	1
5810-01-026-4618	Electronic Transfer Device (KYK-13/TSEC) ON190318	EA	1
6135-01-034-2239	Lithium Battery (BA-5598/U)	EA	2
6135-00-926-8322	Magnesium Battery (BA-4386/PRC-25)	EA	2
6140-01-084-1460	Ni-Cad Battery (BA-586/U)	EA	2
5120-00-061-8543	Hammer, Ball Peen, 16 oz	EA	1
6605-01-196-6971	Compass, Magnetic	EA	1

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIAL LIST

SECTION 1. INTRODUCTION

D-1. SCOPE.

This appendix lists expendable supplies and materials you will need to operate and maintain the AN/PRD-12. These items are authorized by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS.

a. Column 1, Item number. This is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "brush (item 3, appendix D").

b. Column 2, Level. This column identifies the lowest level of maintenance that requires the listed item.

C.....Crew/Operator
O.....Organizational Maintenance
F.....Direct Support Maintenance
H.....General Support Maintenance
D.....Depot Maintenance

c. Column 3, NSN. Indicates the National Stock Number assigned the item; use it to request or requisition the item.

d. Column 4, Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the part number followed by the Commercial and Government Entity (CAGE) in parentheses, if applicable.

e. Column 5, Unit of measure (U/M). Indicates the measures used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr). If the U/M differs from the unit of issue, requisition the lowest unit that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	O	5920-00-785-5471	Fuseholder, Extr	EA
2	C, O	5920-00-938-7660	Fuse, Cartridge	EA
3	C,O	8020-00-597-4761	Brush, Varnish	EA
4	C,O	6450-00-948-5853	Cloth, Lint-free	YD
5	C,O	6810-01-127-4246	Alcohol, Isopropyl	BT
6	O	5985-01-720-4415	Cord, Nylon, MIL-C-5040, Type III	FT
7	O	4030-01-261-6723	Stakes, Guy	EA

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ATTN: AMSTA-US
Stateside, N.J. 07703-5007

DATE SENT
10 September 1989

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 32-5825-001-10	29 AUG 90	Direction Finder Set AN/PRD-12

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PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
2-33	2-5.2.5		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Recommend that Vehicle deployment set up procedures use more illustrations to ensure safe system installation.

REASON: Adding illustrations showing vehicle set up will increase overall AN/PRD-12 safety, while at the same time, reduce unit training costs.

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General, United States Army
Chief of Staff

Official:

PATRICIA P HICKERSON
Brigadier General, United States Army
The Adjutant General

☆U.S. Government Printing Office: 1991-297-665

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 centimeter = 10 millimeters = 0.3937 inch
1 meter = 100 centimeters = 39.97 inches

SQUARE MEASURE

1 sq centimeter = 100 sq millimeters = 0.155 sq inch
1 sq meter = 10,000 sq centimeters = 10.76 sq feet
1 sq kilometer - 1,000 sq meters = 0.386 sq miles

CUBIC MEASURE

1 cu centimeter = 1,000 cu millimeters = 0.06 inch
1 cu meter = 1,000 cu centimeters = 35.51 cu feet

WEIGHTS

1 gram = 1,000 milligrams = 0.035 ounce
1 kilogram = 1,000 grams = 2.2 pounds
1 metric ton = 1,000 kilograms = 1.1 short tons

LIQUID MEASURE

1 milliliter = 0.0338 fluid ounce
1 liter = 1,000 milliliters = 33.82 fluid ounces

TEMPERATURE

5/9 (°F - 32) = °C
9/5°C + 32 = °F
100°C = 212°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
inches	centimeters	2.540
feet	meters	0.305
yards	meters	0.914
miles	kilometers	1.609
sq inches	sq centimeters	6.451
sq feet	sq meters	0.093
sq yards	sq meters	0.836
sq miles	sq kilometers	2.590
acres	hectometers	0.405
cu feet	cu meters	0.028
cu yards	cu meters	0.765
fluid ounces	milliliters	29.573
pints	liters	0.473
quarts	liters	0.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	0.454
short tons	metric tons	0.907
pound-feet	Newton-meters	1.356
pounds/sq inch	kilopascals	6.895
mils/gallon	kilometers/liter	0.425
miles/hour	kilometers/hour	1.609

TO CHANGE	TO	MULTIPLY BY
centimeters	inches	0.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	0.621
sq centimeters	sq inches	0.155
sq meters	sq feet	10.764
sq meters	sq yards	1.196
sq kilometers	sq miles	0.386
sq hectometers	acres	2.471
cu meters	cu feet	35.315
cu meters	cu yards	1.308
milliliters	fluid ounces	0.034
liters	pints	2.113
liters	quarts	1.057
liters	gallons	0.264
grams	ounces	0.035
kilograms	ounces	2.205
metric tons	short tons	1.102
Newton-meters	pound-feet	0.738
kilopascals	pounds/sq inch	0.145
kilometers/liter	miles/gallon	2.354
kilometers/hour	miles/hour	0.621